Gangs applying NO-OX-ID to rail joints move along rapidly causing a minimum of "slow orders".

NO-OX-ID is applied to rail ends and joint bars. All surfaces are completely coated.

Rail ends are thoroughly cleaned with wire brush to remove rust and dirt.

The complete job lasts indefinitely providing protection against corrosion and required lubrication.

TREATING RAIL JOINTS WITH NO-OX-ID ON A BUSY MAIN LINE

Treating the entire rail joint assembly—consisting of joint bars, track bolts, and rail—with NO-OX-ID does two things: prevents corrosion of these parts, caused by brine drippings, cinders, moisture, and other rust accelerators, and acts as a long lasting lubricant, which prevents rail joints from freezing.

NO-OX-ID is easily applied, as indicated by the accompanying pictures. It provides two-way protection against corrosion—mechanically to exclude moisture and gases, and chemically to inhibit corrosion. Detailed instructions for applying NO-OX-ID and estimate of materials required and costs of various rail weights available. Write for complete details.

"THE LEADER FOR 25 YEARS"

NO-OX-ID

IRON-OX-RUST

rust preventive

DEARBORN CHEMICAL COMPANY
Dept. U, 310 S. Michigan Ave., Chicago
New York • Los Angeles • Toronto

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $2.00; Foreign, $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933, at the postoffice at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., postoffice. Address communications to 105 W. Adams St., Chicago 3, Ill.

Nuts are removed from the old rail and uniformly tightened on the new rail. Two Nordberg Power Wrenches are used on this rail laying job.

Three men and this Nordberg Spike Puller pulling all spikes, make faster progress possible.

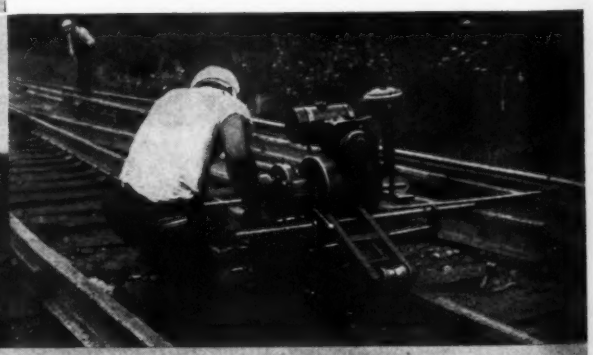
Nordberg Equipped Rail Laying Gang Helps Solve The Manpower Problem

Even though faced with a shortage of manpower, essential track maintenance can be accomplished with the aid of Nordberg Power Tools. The illustrations are of a small rail laying gang of about 50 men. The time and labor saved by the six Nordberg tools on this job is typical of how Nordberg equipment is helping solve the manpower problem and keeping track properly maintained to meet the demands occasioned by wartime traffic.

NORDBERG POWER TOOLS

Adzing Machine	Spike Puller
Track Wrench	Rail Drill
Power Jack	Rail Grinders

A tough tie adzing job made easy, uniform tie seats provided and better track attained with these two Nordberg Adzing Machines.



Many man hours were saved at switches with the use of Nordberg Rail Drill. This machine is especially adapted for operating in confined locations.

NORDBERG MACHINERY

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York

OH, FOR THE LIFE OF A MAINTENANCE BOSS

● Before the war, he battled blizzards, blockades, washouts, and wrecks . . . then went fishing.

Now, in addition, he fights extra wear and tear as troops, guns, food, and war materiel move across the country in the greatest railroad traffic stream of all time.

To keep up with this battle of repairs, the maintenance-of-way boss has less material, less manpower . . . less of everything. His problems are manifold but on one count, at least, we feel that we have made life just a wee bit easier for him.

Because the tools in our Devil Line are hand forged and heat treated from electric furnace alloy tool steels, with all cutting edges and striking faces precision ground and heat treated, they stay on the job longer, and require less time out for redressing.

The famous Flex-Toe Claw Bar saves precious time, too, because two men can pull as many spikes with Flex-Toes as three men can with ordinary bars.

Like all good citizens, the maintenance boss keeps pitching full tilt day after day . . . but in his few spare moments . . . he *dreams* about his favorite fishing rendezvous.

WARREN HEAVY HAND TOOLS

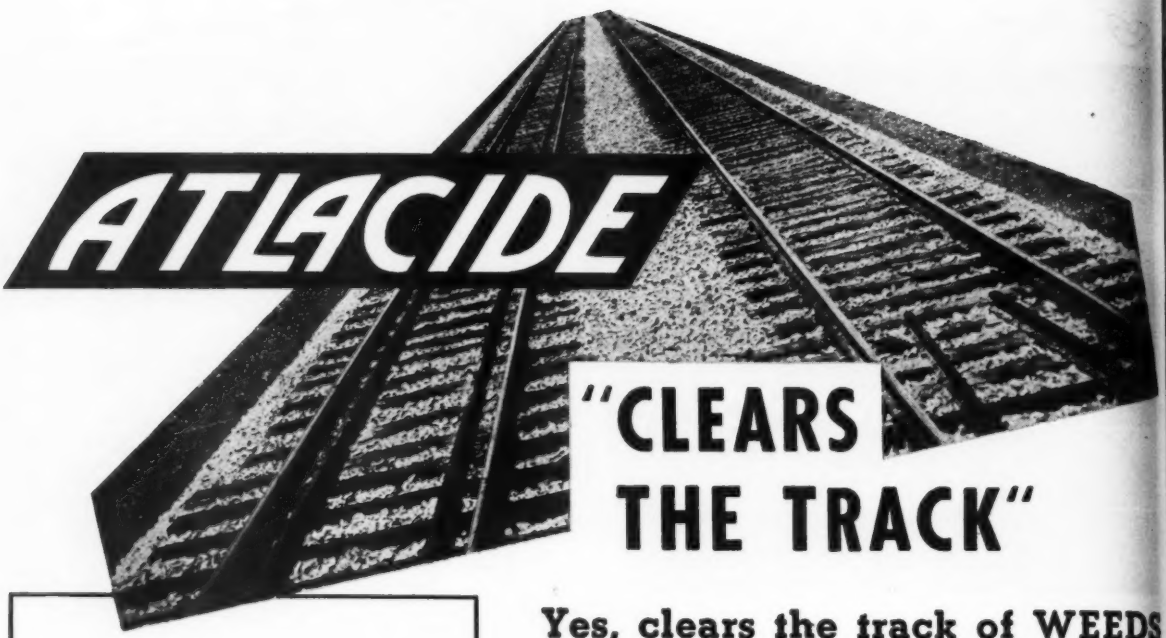
WARREN TOOL CORP. · WARREN, OHIO

CLAW AND TAPPING BARS,
CLAY AND TAPPING PICKS,

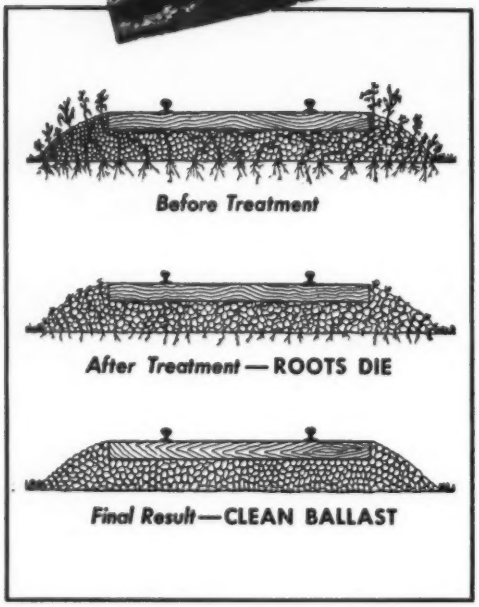
★ ★ ★

TRACK AND OX-DEVIL CHISELS,
SPIKE MAULS, SLEDGES, ADZES

ATLACIDE



"CLEARS THE TRACK"



Yes, clears the track of WEEDS . . . to clear the way for better, labor-saving maintenance.

Don't allow a weedy track to discourage your track forces!

Chemical weed control with Atlacide and Atlas "A" gives the track worker a break . . . saves time and manpower, so important under war-time conditions.

Application with our standard spray equipment is simple and rapid, causing no interference with normal train movement. The manpower required is nominal as compared with other weed control methods.

Remember, too, Atlas Weed Killers (Atlacide Liquid, Atlas "A" and Atlacide Spray Powder) kill the roots . . . the best way to progressively reduce weed growth and obtain weed free ballast.

Now, more than ever before, chemical weed control pays dividends in cleaner ballast and improved morale of track forces.

ATLACIDE
CHLORATE WEED KILLER

and

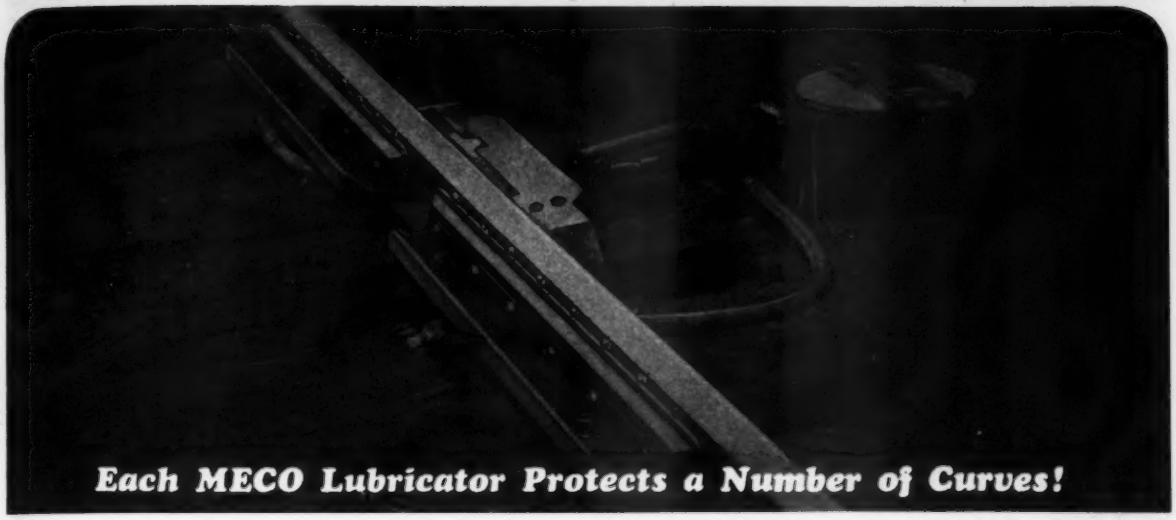
ATLAS "A"
ARSENICAL

CHIPMAN CHEMICAL COMPANY, INC.

Chicago, Ill. • BOUND BROOK, N. J. • Houston, Tex.
Palo Alto, Calif. • No. Kansas City, Mo.
Portland, Ore. • Winnipeg, Man.

~ Over Twenty-five Years of Weed Control Service ~

MECO'S OIL RELAID CURVE RAILS, TOO!

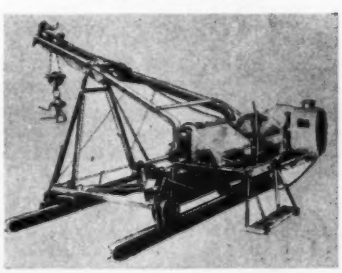


Each MECO Lubricator Protects a Number of Curves!

Get Double Duty from "Meco" Curve Rail Lubricators. Apply them NOW . : . First, they double to quadruple the remaining life of your present curve rails . . . Second, they'll stay right on the job, when you relay rails—and double to quadruple the life of the new curve rails . . . "Meco's" hook right up for the new curve rails, with little or no cost for new parts!

Let Us Analyze Your Curve Territory Charts and Suggest "Meco" Locations

POWER RAIL LAYER



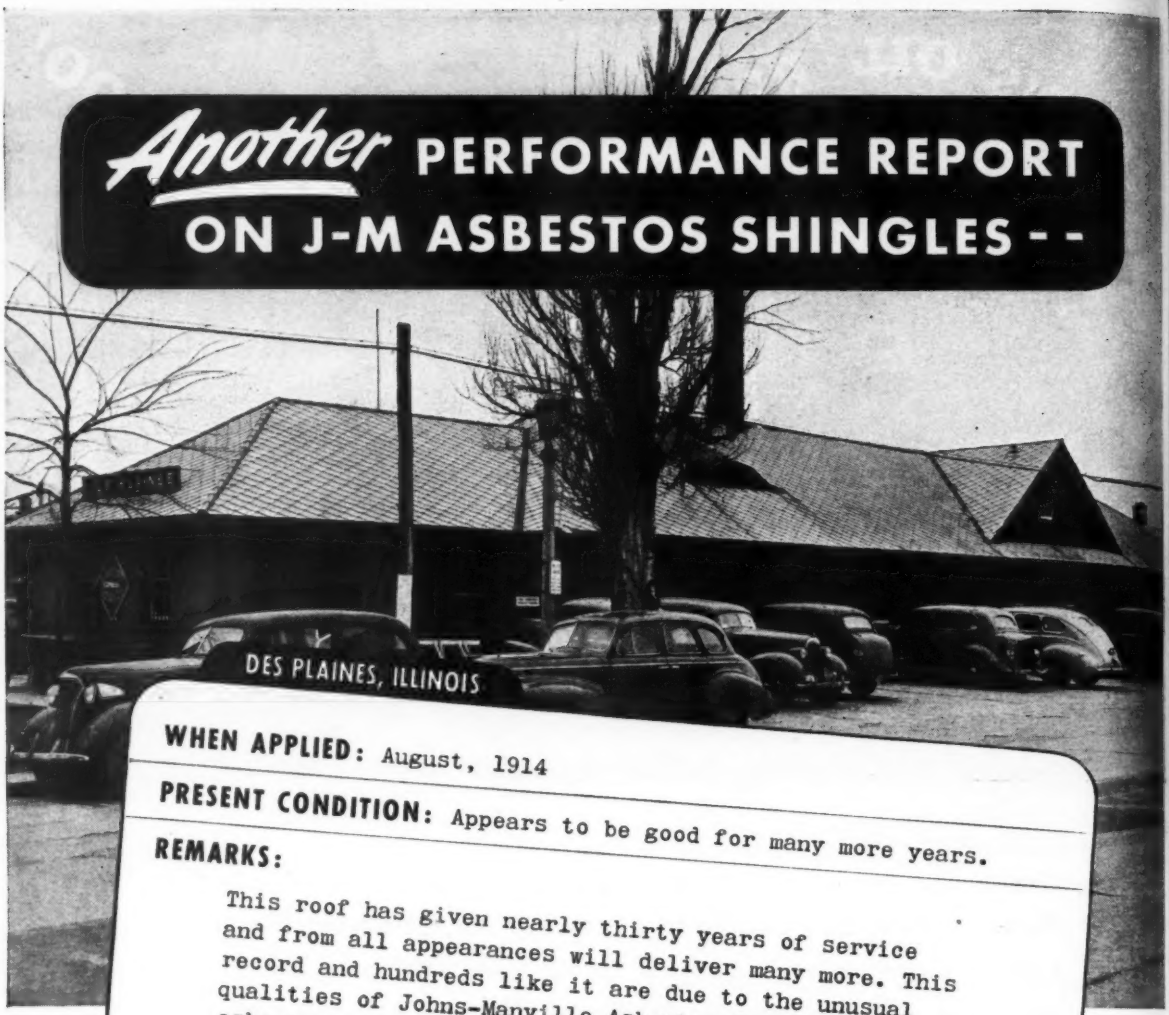
Requires No Train Orders or Train Crew

MACK REVERSIBLE SWITCH POINT PROTECTORS

Prolong Switch Rail Life 8 to 10 Times

MAINTENANCE EQUIPMENT COMPANY Railway Exchange Building CHICAGO, ILLINOIS

Another PERFORMANCE REPORT ON J-M ASBESTOS SHINGLES - -



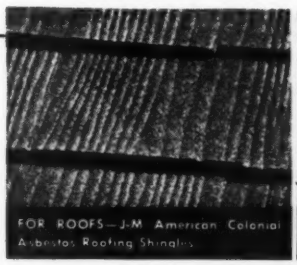
DES PLAINES, ILLINOIS

WHEN APPLIED: August, 1914

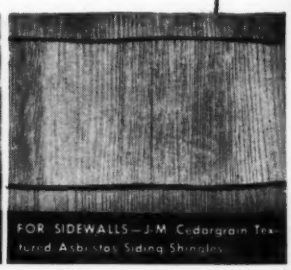
PRESENT CONDITION: Appears to be good for many more years.

REMARKS:

This roof has given nearly thirty years of service and from all appearances will deliver many more. This record and hundreds like it are due to the unusual qualities of Johns-Manville Asbestos Shingles. Made of asbestos and cement, these shingles are not only weatherproof and rotproof—but fireproof as well. And they do not require preservative treatment of any kind.



FOR ROOFS—J-M American Colonial Asbestos Roofing Shingles



FOR SIDEWALLS—J-M Cedargrain Textured Asbestos Siding Shingles

Johns-Manville Asbestos Roofing and Siding Shingles are now available for permanent repairs and new installations where necessary. For complete details, write Johns-Manville at New York, Chicago, Cleveland, St. Louis or San Francisco.

JOHNS-MANVILLE

JM

PRODUCTS

JOHNS-MANVILLE

86 YEARS OF SERVICE TO TRANSPORTATION

Insulations • Packings • Friction Materials • Refractory Cements • Building Materials

ONE OPERATOR

Can Flame-Straighten Joint Bars with OXWELD'S SEMI-MECHANIZED METHOD

• Worn or bent joint bars permit sag at the rail joints and intensify the effects of rail-end batter. This contributes not only to rail deterioration, but also causes excessive wear, vibration, and shock on locomotives and cars.

Flame-straightening of joint bars has proved to be a quick and economical method for overcoming this condition. In this procedure, two oxy-acetylene blowpipes are used to heat simultaneously—from opposite sides—an area on the base of the joint bar at each low joint. Then, after the metal cools and contracts, a more nearly true riding surface is restored.

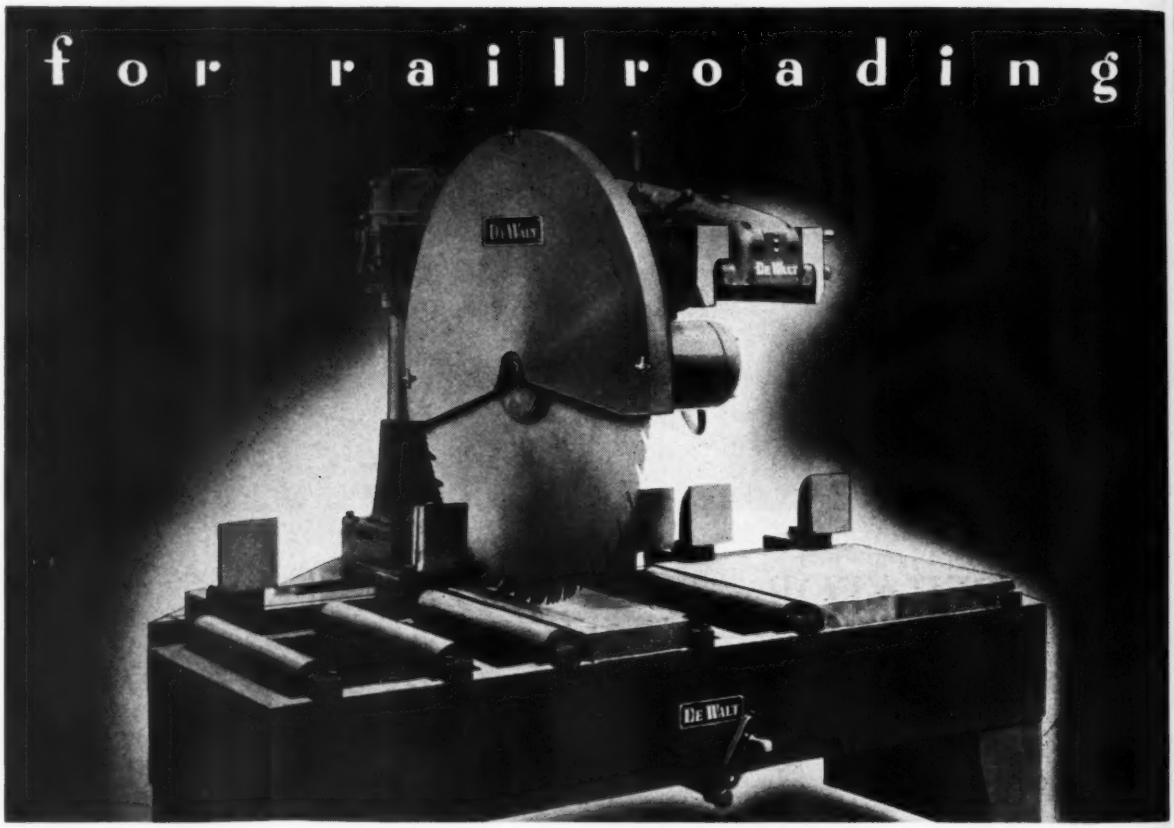
By using the semi-mechanized method developed by Oxweld, a single operator is able to do this work effectively, and the second operator, ordinarily required, is freed for other needed work.

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS

DE WALT
TIMBER CUTTER

for railroading



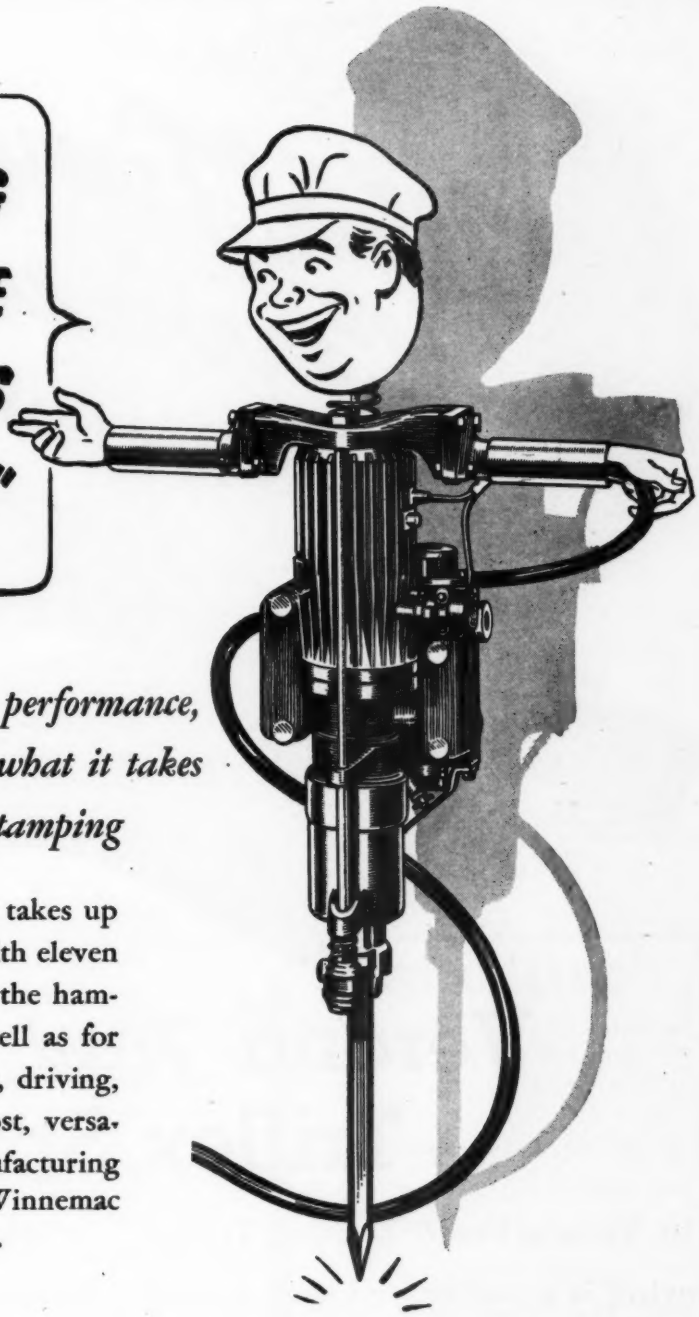
Here's a timber cutting and tie-dapping machine that's saving materials, manpower and cutting time by pre-cutting lumber for bridges, buildings, ties, etc., right at the mill.

By using a roller-conveyor system, straight line production methods are possible. In this way, the rough timber enters one end of the line—the *finished* timber comes out the other.

Consider the savings you can effect in turning out miscellaneous timbers—delivered to the job ready for nailing. If such a set-up can help you, we invite you to consult a DeWalt field engineer. For complete information, address DeWalt Products Corporation, 4901 Fountain Avenue, Lancaster, Penna.

DE WALT
RADIAL POWER SAWS
LANCASTER, PA.

"TYTAMPING IS ONLY ONE OF THE JOBS I DO WELL!"



Rugged in construction and performance, the Barco unit tytamper has what it takes to make light work of tytamping

It's a self-contained unit that takes up little room in your truck. With eleven special tool attachments, it's the hammer for that special job as well as for regulation breaking, drilling, driving, tamping or digging. Low cost, versatile, and efficient. Barco Manufacturing Company, Not Inc., 1805 Winnemac Avenue, Chicago 40, Illinois.

BARCO portable gasoline HAMMERS

Light in Weight Rugged in Construction

War Time Service

...PROVES VALUE OF

Verona *Fixed Tension* Triflex Spring

The Verona Fixed Tension Triflex Spring is a calibrated leaf spring for track bolts. Its high reaction (over 250% of A. R. E. A. specifications) compensates for any looseness developed from wear while retaining at all times equal bolt tension throughout the joint.

Write Today for complete information

SINCE 1873 **WOODINGS-VERONA TOOL WORKS, VERONA, PA.** SINCE 1873

Don't Scrap Your Old Pipe

Pittsburgh Pipe Cleaning Service

Will Make It As Good As New!

With the complete pipe cleaning, engineering and operating service we offer to the railroads, it's a simple and economical matter for you to get as much as two or three times your present flow volume from the pipes you are now using.

Pittsburgh hydraulic pipe cleaning methods, providing for the use of specially designed electric tools, have the following advantages:

Long stretches of pipe can be cleaned—hundreds or even thousands of feet in a day.

Pittsburgh electric cleaning tools clean around the 90 deg. ell and work through the hardest deposits, cleaning back from the cut to the pump and also the suction.

Write us today for illustrated circulars, with actual facts and case histories from the field.

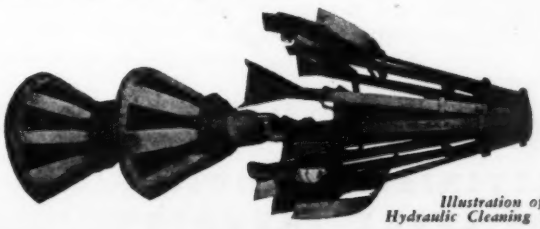


Illustration of 16" Hydraulic Cleaning Tool

JOB ANALYSIS

of A Recent Contract for the Cleaning of Water Supply Line to Railroad Track Pans

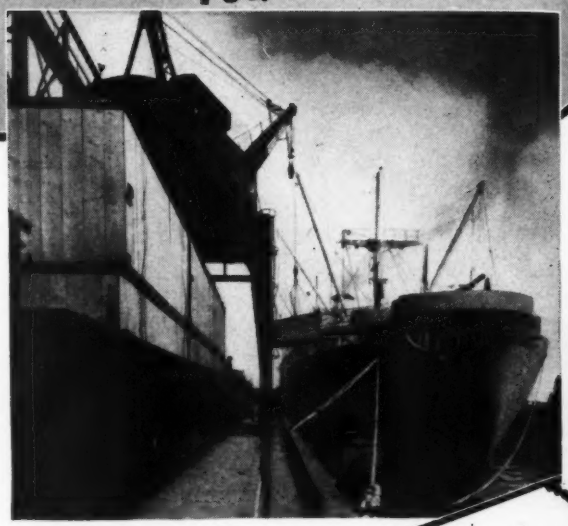
Length of Pipe	12,500 feet
Size of Pipe	8" Cast Iron
Type of Cleaning	Hydraulic
"C" Coefficient Before Cleaning	50
"C" Coefficient After Cleaning	120
Gallons Per Day Before Cleaning	392,000
Gallons Per Day After Cleaning	953,080

PITTSBURGH PIPE CLEANER COMPANY

433 Melwood Street — Pittsburgh 13, Penna.

AMERICAN

MATERIALS HANDLING FOR EVERY INDUSTRY

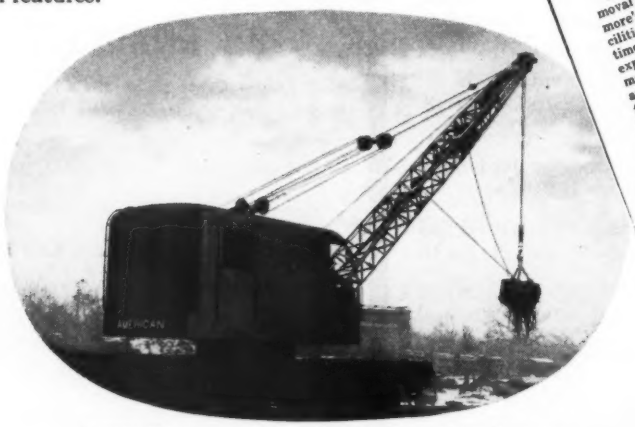


AMERICAN REVOLVER handling freight at Baltimore.

AMERICAN REVOLVERS SPEED FREIGHT HANDLING

Freight can be handled in different ways. Here is a set of conditions, best met by the AMERICAN REVOLVER—a gantry mounted revolving crane. Being adapted to materials handling by hook, magnet, or bucket, having great lifting capacity, movability, and reach, the AMERICAN REVOLVER makes an easy job of wrestling with freight at busy ports.

Perhaps the AMERICAN REVOLVER is the ideal method of materials handling for your freight terminals and docks. Now is the time to look into it. Catalog 400-R-1B gives full particulars on application and construction features.



AMERICAN Locomotive Crane for yards, shops and maintenance.

New Shipping Records Are Reported In Revival of the Port at Baltimore

BALTIMORE, MD.—With virtual removal of the U-boat menace, Baltimore's shipping industry and port facilities are now in the midst of a wartime boom such as it had never before experienced. New and greater demands are now being met by the port and new records are being established for unloading of incoming and loading of outgoing vessels. The diversity of cargoes handled has set a new high. Exports, at the moment, far outweigh incoming cargo. This is because of the large cargoes for fighting fronts, lend-lease supplies and equipment. Imports, however, are registering steady upward gains, mostly from Latin-America.

Arrival of incoming cargoes of petroleum products has again become almost normal. Molasses shipments by tanker have been resumed, indicating a steady growth in tanker fleets.

Baltimore is an important terminal for three major railroads, which bringing in large quantities foods for trans-shipment for use in Balti[more]

Ships Called Instruments of Foreign Policy

World War II is a "war Kuecker, president of Kuec Chicago, declared in for the Junior Trad scribing the job ing, Mr. Ku Transporta School of ing circu appr

4415

Plan now . . . but wait for **AMERICAN!**

AMERICAN MATERIALS HANDLING *for* EVERY INDUSTRY

AMERICAN HOIST & DERRICK CO.

Saint Paul 1, Minnesota

CHICAGO SAN FRANCISCO NEW YORK

Wherever wire rope is fastened . . . . use genuine **CROSBY CLIPS** *with the Red-U-Bolt*

3 Easy Steps

TO STOP RAIL JOINT *Corrosion*

1 RMC RAIL JOINT PACKING is furnished in moulded blocks 12 in. long, packed in cartons containing sufficient material for packing one joint. The packages are easily handled and, as illustrated, the entire packing operation is quickly performed by three men.

2 Six RMC blocks are placed on the inner faces of 6-hole joint bars before assembling (four for 4-hole joints).

3 The joint bars are applied to the rail in the regular manner with the handy RMC Tool. The bolting action presses the material into every section of the joint assembly, so that all fastenings and surfaces are thoroughly lubricated and protected.

RMC
Rail Joint
Packing

One application of RMC RAIL JOINT PACKING provides *complete, permanent* protection for rail joints against all corrosive agencies. It also lubricates the joint so thoroughly that the rails cannot "freeze" when bolts are properly tensioned, but are free to expand and contract uniformly.

Get a Supply of RMC RAIL JOINT PACKING NOW—while you can get ALL you need.

RAILWAY MAINTENANCE CORP.
PITTSBURGH 30, PENNSYLVANIA

HEAVY STRUCTURAL DIMENSION AND TIMBERS ARE AVAILABLE

W.P.B. Material Substitutions and Supply List, Issue No. 12, which indicates the relative availability of the most important materials essential to the war, states:

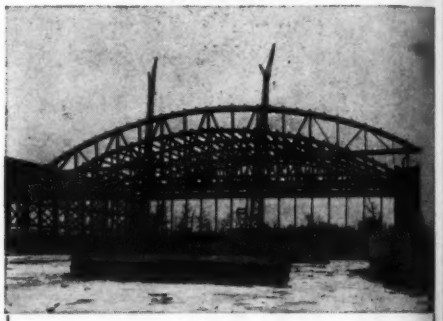
GROUP III

"Supplies of Group III materials, except for local shortages, are readily AVAILABLE for essential uses. They should be used instead of those in Groups I and II wherever possible.

"(III) D. LUMBER

"Cedar, Red, Western: Timbers.
"Cypress: Pecky; Timbers.
"Douglas-Fir: Dimension (3" and 4" thicknesses only); Timbers.
"Hemlock, Western: Dimension (3" and 4" thicknesses only); Timbers.
"Larch, Western: Dimension (3" and 4" thicknesses only); Timbers.
"Pine, Southern: Dimension (3" and 4" thicknesses only); Timbers.
"Redwood: Timbers."

The lumber manufacturing industry recommends that 3-inch and thicker lumber be specified for essential construction uses as a stimulus to the production of the much needed 1-inch and 2-inch lumber, which generally is produced along with structural and timbers...Specifying and design officers can help by specifying timber construction using these available sizes and dimensions...Well balanced orders facilitate maximum production of lumber.



Cleveland Municipal Airport 201' clear span timber trusses prefabricated by Timber Structures, Inc., Portland and New York...glued-laminated top and bottom chords using Teco Connectors with 28' glued-laminated columns.

NATION-WIDE TIMBER FABRICATORS CAN SERVE YOU

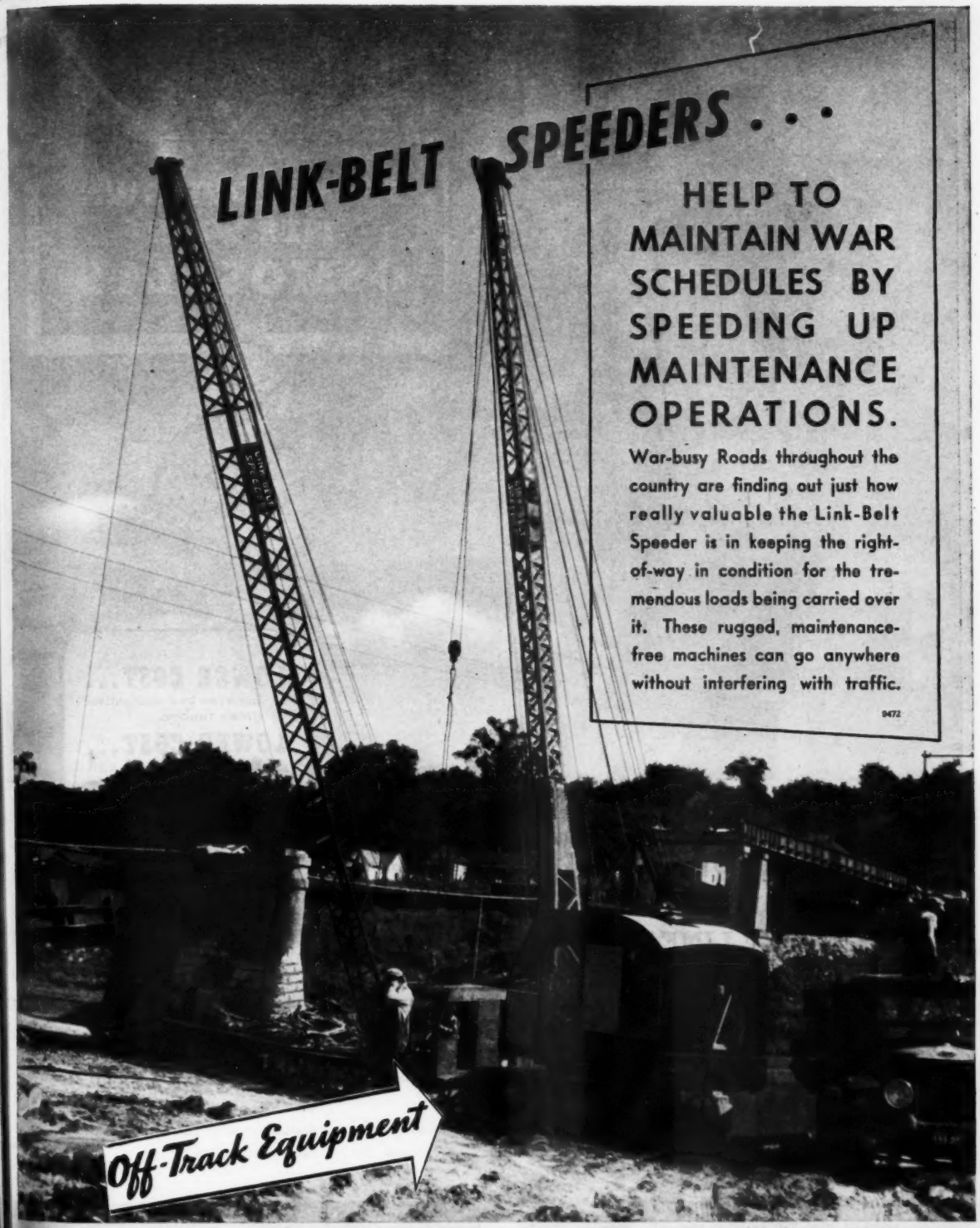
Experienced timber fabricators have large production facilities throughout the country to aid the war effort promptly...And these facilities are ready to serve private industry in postwar planning...: Consult them now or write us.

Specify
TECO
The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood.

TIMBER ENGINEERING COMPANY
WASHINGTON, D. C. • PORTLAND, OREGON

TIMBER CONNECTORS AND TOOLS

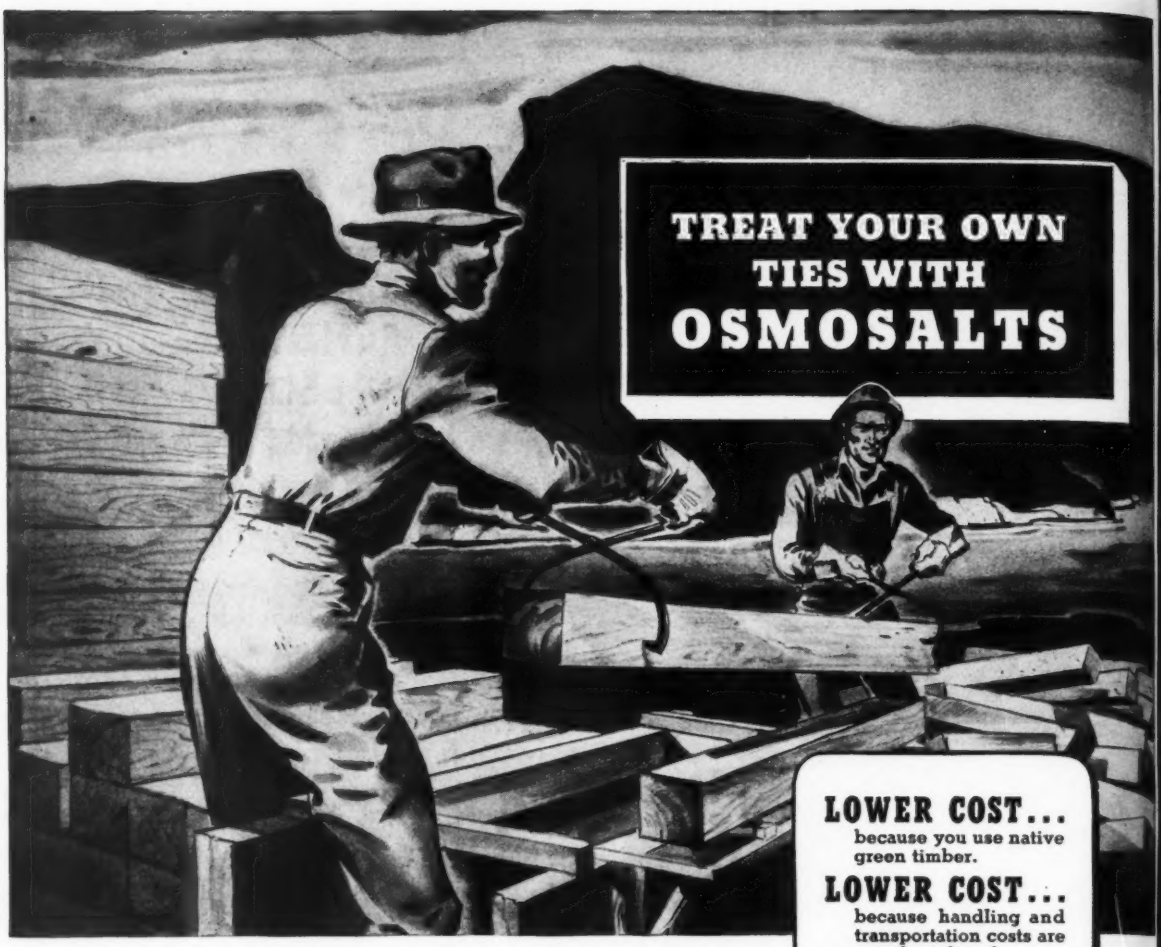
Endorsed by Leading Lumber Manufacturers and Fabricators


LINK-BELT SPEEDERS . . .
HELP TO MAINTAIN WAR SCHEDULES BY SPEEDING UP MAINTENANCE OPERATIONS.
War-busy Roads throughout the country are finding out just how really valuable the Link-Belt Speeder is in keeping the right-of-way in condition for the tremendous loads being carried over it. These rugged, maintenance-free machines can go anywhere without interfering with traffic.
9472
Off-Track Equipment

LINK-BELT SPEEDER

Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO-9, ILL.
A DIVISION OF LINK-BELT COMPANY



LOWER COST... because you use native green timber.

LOWER COST... because handling and transportation costs are greatly reduced.

LOWER COST... because no special, expensive equipment is needed.

LOWER COST... because it can be applied with any unskilled labor.

Here's a timely Tie Treating Program for SHORT LINES

● With treated ties "tighter" than steel, many Short Lines are having a tough time carrying out even the most essential track maintenance programs. We believe however, that OSMOSALT Preservative treatment is your answer. Here, briefly, is the plan:

You can secure green sawed or hewn ties adjacent to your right of way. No need to use high-cost woods . . . any inexpensive fresh-cut timber of sufficient strength will do.

By dipping these green ties into a small portable vat... containing the proper concentrated mixture of OSMOSALTS and water, then dead stacking...Nature takes its course, and the phenomina of osmosis preserves the timber. Under such a program, your ties should cost less than second hand creosoted ties. In the bargain, you will get a tie that will last many times longer.

This plan is now in successful operation on other Short Lines. No expensive equipment or skilled labor is necessary. We'll gladly give you all the facts and get you started on your TIE SAVING program. Write today.

MORRISON
RAILWAY SUPPLY CORP.
EXECUTIVE OFFICES • • • BUFFALO 12, N. Y.
CHICAGO 4, ILL. BIRMINGHAM 3, ALA.

Compression Rail Anchors

For Economical and Effective Two-Way Holding of Rail

THE RAILS COMPANY

178 Goff St., New Haven 11, Conn.

MAKE 'ER LAST!

Heaven only knows when you'll get a new one

YOU of course are taking every precaution to make your present car last for the duration.

One way to help insure this is to cushion it against road-pound, twist and consequent wear, with soft-action HOUDAILLE* Shock Absorbers.

In the unprejudiced judgment of engineers, the hydraulic principle is scientifically right for shock absorber design. And Nature too agrees—otherwise she wouldn't put fluid in your joints, and around your heart and lungs.

This makes you live longer. And the same sound principle will likewise make your car live longer.

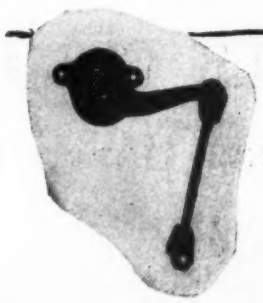
Remember, Houdaille Hydraulic Shock Absorbers are double-acting. They neutralize up-and-down shock, and also act to prevent chassis twist and car swerve.

Especially are Houdaille Hydraulic Shock Absorbers protective to your precious, irreplaceable tires.

From time to time, let a specially trained Houdaille service expert inspect your Houdaille Shock Absorbers—this is highly important to your car's life.

Should your shock absorbers require attention, your Houdaille service expert will replace them with genuine factory rebuilt units, on the car manufacturer's exchange plan.

HOUDE ENGINEERING DIVISION OF
HOUDAILLE-HERSHEY CORPORATION
Makers of Hydraulic Controls
BUFFALO 11, NEW YORK



BUY U. S. WAR BONDS

For a smoother ride

HOUDAILLE*

Hydraulic Double Acting

SHOCK ABSORBERS

* *Pronounced* "HOO-DYE"

AND THIS IS HAPPENING EVERYWHERE

. . . every minute of every hour, every day; passenger travel doubled, *and doubled again.* Yet it tells only part of the railroad story of today. For behind the scenes, troops by the million and freight trains by the mile all clamor for precedence . . . imperative in their demand for swift, safe, "on-time" schedules. To this great task of the American rail systems . . . where efficiency of right-of-way maintenance is more than ever a vital factor . . . Fairmont Railway Motor Cars make a definite contribution linked to speed, safety and certainty of service. Through more than 35 years Fairmont has devoted its resources to the design, manufacture and consistent improvement of railway motor cars, covering every phase of service from one-man Inspection to full Section Gang operations. That Fairmont motor cars have demonstrated their day-in and day-out dependability is reflected in the fact that more than half the railway motor cars in service today are Fairmonts. Fairmont Railway Motors, Inc., Fairmont, Minn.

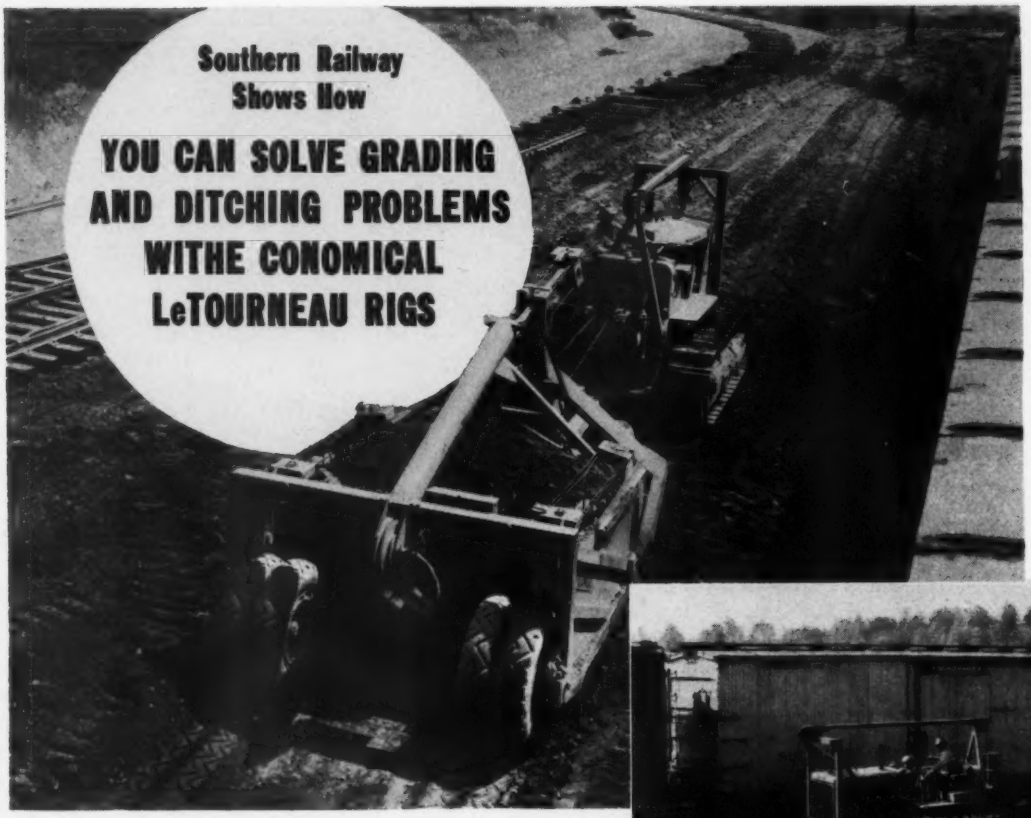
Performance ON THE JOB COUNTS

M19 Series E is a 1 to 4 man car with light extension lift. Chassis is spring mounted for smooth riding.

Fairmont Railway Motor Cars

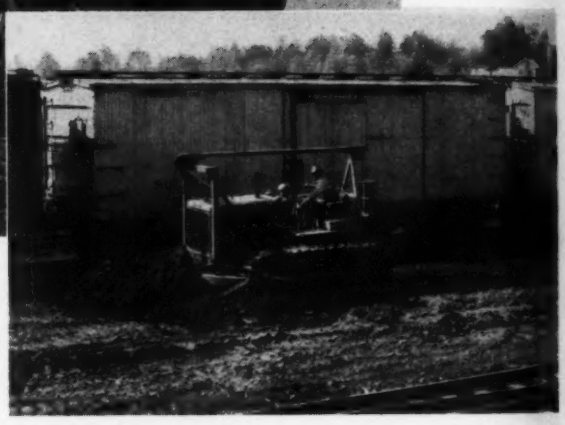
Southern Railway
Shows How

YOU CAN SOLVE GRADING AND DITCHING PROBLEMS WITHE CONOMICAL LeTOURNEAU RIGS



LeTourneau Carryall Scrapers are cutting earthmoving costs for Southern Railway on curve realinement and other jobs—they can do the same for your railroad.

Southern finds LeTourneau Dozers economical for smoothing and spreading work between tracks—these Dozers are just as handy on right-of-way construction jobs, too.



Job-proved units, working off-track, keep Southern's revenue trains rolling—Eliminate traffic delays—No big crews or work trains needed—Make 50 to 60 minutes of every work hour productive

Like so many other alert railroads, Southern Railway Co. is turning away from heavier, more expensive, on-track equipment . . . now handles much of its right-of-way construction, side ditching, and grading projects with LeTourneau Carryall Scrapers, Dozers and Rooters . . . finds this new off-track method faster and cheaper.

Cut Costs to 6c per Cu. Yd.

For example, at Flippen, Georgia, on the main line between Atlanta and Macon, Southern saved money by using LeTourneau Carryalls and a Dozer on an important curve realinement job involving:

80,730 cu. yds.—Excavation into embankment
62,656 cu. yds.—Borrow

143,386 cu. yds.—Total Grading Yardage

Result: Cost of grading was slashed to 6c per cu. yd. as compared with previous charges of 23c to 40c per cu. yd. for earthwork at this same point.

Adaptable to Many Uses

Southern's experience with flexible, one-man operated LeTourneau units has proven their adaptability for a wide variety of other types of railroad construction, maintenance and operating tasks like these:

Construction of drainage and berm ditches
Shaping of roadbed for new track construction
Spreading and compacting material from dump cars on trestle-filling projects
Heavy grading jobs
Cleaning side ditches

With LeTourneau units you save on equipment investment, too—same tractor operates Carryall Scraper, Dozer, Crane and Rooter. Change from one unit to another is easily and quickly made.

Equip your construction crews with fast, modern, money-saving LeTourneau rigs—let them handle tomorrow's railroad curve realinement programs which will call for the moving of large mountains of dirt. You'll agree with Southern that this is the economical method of doing the job!

Planning Help Available

Experienced LeTourneau Field Engineers will gladly help you with your specific railroad construction or maintenance problems. Fill in the coupon below and mail it TODAY for Engineering assistance and FREE literature.

For more information, fill in this coupon and mail TODAY.

LETOURNEAU
PEORIA, ILLINOIS · STOCKTON, CALIFORNIA

R. G. LeTourneau, Inc., Dept. REM-544, Peoria, Ill.
Please send me:
☐ More information about your Field Engineering Service, for aid on my special problems.
☐ Industrial Folder A-284, describing railroad applications for your money-saving equipment.

Name .....
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Company .....
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OLIVER

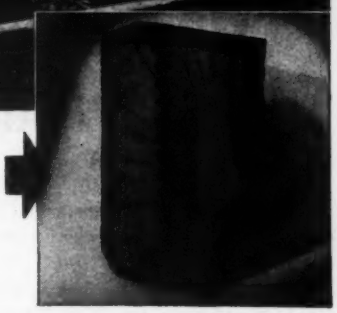
SCREW and DRIVE SPIKES

Save Vital Man Hours!

Umbrella Head Screw Spike with Rolled Pilot Point.

Hold Down Drive Spike—Can be installed without wrenches.

The new Oliver Timber Spike for trestles and other structures.



TWELVE YEARS SERVICE. This unretouched photograph showing a section of red oak tie in heavy traffic service for twelve years, attests security of the Oliver Screw Spike grip. Note the clearly defined screw threads, the absence of rust, rot and fibre ruptures.

Oliver presents a complete line of Screw and Drive Spikes developed to meet railroad demands for dependable, long lasting, easily installed fasteners. Thoroughly tested in railroad service, these products cut maintenance costs, save installation time, and provide greater gripping power to prevent shifting tie plates, eliminate respiking and split ties.

Investigate the possibilities of reducing *your* track maintenance costs with Oliver Screw and Drive Spikes.

Oliver makes a Complete Line of Specialized Railroad Fasteners, Washers and Rivets.

OLIVER
IRON AND STEEL
Corporation

Write for OLIVER Catalogue No. 4 RAILROAD ACCESSORIES

SOUTH TENTH AND MURIEL STREETS · PITTSBURGH, PENNSYLVANIA

What good is a $10.00 raise ...if it then costs you $12.00 more to live?

SURE WE ALL want a raise . . . but raises today are bad medicine. Bad medicine for you. Bad medicine for everybody else. And here's why . . .

Suppose you do get a raise . . . and a lot of others get one, too. What happens? The cost of manufacturing goes up. Naturally your boss has to add this increase in cost to the price he asks the retailer. And the retailer, in turn, raises his price to the consumer . . . that's YOU.

Multiply these hundreds of items that everybody has to *pay more for* by the thousands of other workers who want raises . . . and by the thousands of business men and farmers who want more money for their products . . . result . . . you and all the others need another raise to make ends meet.

And so it goes . . . wages and prices chase each other up and up . . . until prices get so high that your dollar isn't worth a dollar any more.

So what good is a raise if your living costs go up even faster? And there's so little you can buy today anyway . . . with most factories in war production.

Of course it's hard to give up the luxuries of life . . . and even harder to give up some of the necessities. But this is War! And when you think of the sacrifices our fighting men are making . . . many of them giving up their lives for us . . . no sacrifice we can make should be too great.

So if you want to be able to enjoy the good things of life in the peaceful days to come . . . if you want to speed victory and thus save the lives of thousands of fighting men . . . start doing these seven things now . . .

1. Buy only what you need. Take care of what you have. Avoid waste.

2. Don't try to profit from the war. Don't ask more than you absolutely *must* for what you have to sell . . . whether it's *goods* or your own *labor* you're selling.

3. Pay no more than ceiling prices. Buy rationed goods only by exchanging stamps. Otherwise, you're helping the black-market criminals, hurting yourself and all other good Americans.

4. Pay taxes willingly. They're the cheapest way of paying for the war.

5. Pay off your old debts—all of them. Don't make new ones.

6. If you haven't a savings account, start one. If you have an account, put money in it—regularly. Put money in life insurance, too.

7. Buy and hold War Bonds. Don't stop at 10%. Remember—Hitler stops at nothing!

Use it up . . . Wear it out. Make it do...Or do without.

HELP US KEEP PRICES DOWN

A United States War message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by the Magazine Publishers of America

Ready Now FOR YOUR *Super* CUTTING JOBS ...*Super DBL* HIGH SPEED STEEL

NO COMPLICATIONS IN HEAT TREATMENT OR HANDLING

For any shop man familiar with the techniques used on tungsten cobalt steels, or on the 18-4-1 and tungsten-moly analyses, there will be nothing new in the handling and treatment of *Super DBL*. It also conforms to standard in the forms and finishes available, which include regular sizes of mill-treated tool bits and can be supplied from Allegheny Ludlum warehouse stocks, as well as distributors, in principal cities coast to coast.

ALLEGHENY LUDLUM mill technicians developed this new High Speed Steel to fill a dual role: first, to meet government requirements for the conservation of strategic materials; and second, to give you a higher degree of hardness and cutting stamina than has been previously available in steels which meet the conservation need.

Super DBL (a low-tungsten, molybdenum, cobalt steel) has been thoroughly tried and tested in service—it's ready to take on your heaviest-duty production work. Use it on hard, gritty castings—on heat treated alloy or stainless steels—on any rough and tough cutting job in the shop with full assurance of maximum red hardness and performance. ● For full data on properties, treatment and use, write for the *"Super DBL* Blue Sheet."

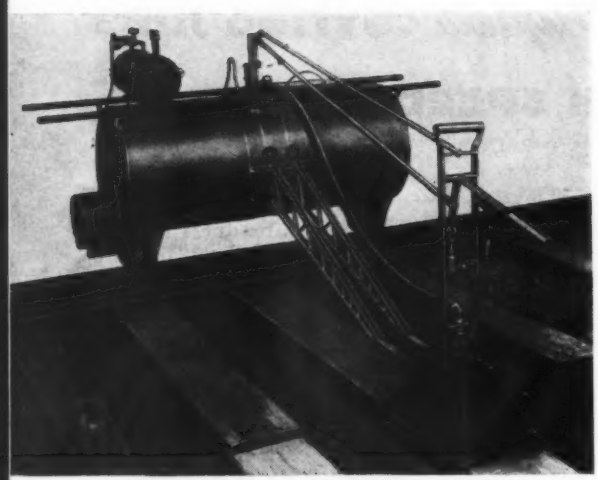
ADDRESS DEPT. RE-22

Allegheny Ludlum
STEEL CORPORATION
BRACKENRIDGE, PENNSYLVANIA

A-9074 . . . W&D

Santa Fe

Two Evidences of Leadership



The Improved Woolery Creosote Sprayer

The tank has a capacity of 60 gallons and is equipped with a horizontal type gasoline Generator Burner for heating the creosote. A 6-inch flattened heater tube located near the bottom runs lengthwise of the tank from one end nearly to the other end up through the top.

A wind-protection hood confines the spray to the adzed area of the tie, resulting in minimum waste of creosote and protecting workmen from creosote burns.

Write for new illustrated circular.

2

As the Super Chief evidences the leadership of the Santa Fe in ultra-modern passenger service, so does the use of the Woolery Creosote Sprayer demonstrate the continued leadership for which this road has been recognized through the years in all those measures designed to conserve cross ties and secure maximum life therefrom. Acceptance of the Woolery Creosote Sprayer for the protection of freshly adzed surfaces of cross and switch ties, reduces their deterioration to the minimum and secures maximum life from the ties—the largest single expenditure of the railways with the sole exception of fuel.

With the improved Woolery Creosote Sprayer, two men can protect freshly adzed surfaces more uniformly and thoroughly and more rapidly than is possible by hand swabbing. One man pushes the equipment along the rail while the other operates the spray hood.

WOOLERY MACHINE CO.

MINNEAPOLIS **MINNESOTA**

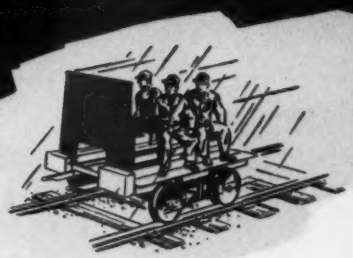
Pioneer Manufacturers of

RAILWAY MAINTENANCE EQUIPMENT

TIE CUTTERS ● SWITCH HEATERS ● MOTOR CARS

RAILWAY WEED BURNERS ● BOLT TIGHTENERS

Motor Cars That Meet the Emergency

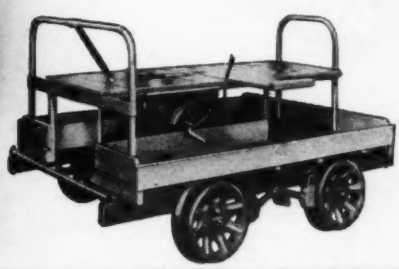


Fairbanks-Morse Motor Cars meet railroad wartime emergency needs for cars that stand up—that can take it 24 hours a day—in all kinds of weather—and under all conditions.

They are sturdy—reliable—powerful—safe motor cars that are backed by years of railroad experience in motor car design and construction.

The complete line of Fairbanks-Morse-built Sheffield Motor Cars includes sizes ranging from one-man cars up to heavy-duty motor cars. Bulletins and complete information supplied upon request.

Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

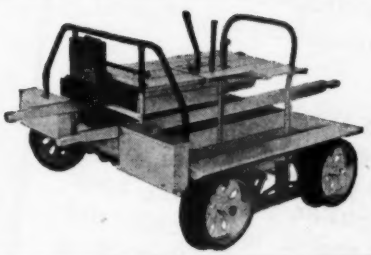


SHEFFIELD MODEL 44-B—The standard section car on many railroads. Sturdy, roomy. Weighs 1095 pounds. Has ample power to haul trailers loaded with men, tools or ties. Water-cooled 8- to 13-hp. engine with air-cooled head. Chain drive.

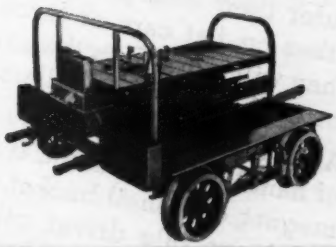
First on the Rails... and Still First

SHEFFIELD MODEL 40-B—One of the finest heavy-duty motor cars on rails. Has powerful engine—weighs 1235 pounds—ample room for section gangs. Has four speeds forward and reverse, with more than enough power to haul trailers.

NEW FAIRBANKS-MORSE VICTORY MODEL 57—The one-man inspection car, easily handled by one man alone. Has dependable 9-hp., water-cooled engine. Equipped with clutch and roller chain transmission.



NEW FAIRBANKS-MORSE VICTORY MODEL 757—Inspection car is similar to Model 57, but belt-driven.



SHEFFIELD MODEL 54-B—Inspection car for 1 to 4 men. Has 5- to 8-hp., water-cooled engine—self-centering, powerful brakes, wood center wheels—adjustable rear axle box—and is chain-driven. Model 754-B is belt-driven.

Buy War Bonds

FAIRBANKS, MORSE & CO.

FAIRBANKS-MORSE BUILDING, CHICAGO 5, ILLINOIS

Canadian Fairbanks-Morse Co., Ltd., Montreal

MEMBER 1944

WORKS

FROM THE CAR

OR ON THE GROUND!

NORTHWEST Crawler Cranes are at home either on the car or on the ground. They load themselves under their own power, will travel from car to car either on flat cars or through drop-end gondolas. They will work from the car, unloading any class of material from rail to ballast.

And your Northwest is equally at home with any type of handling equipment. It is equally efficient with a magnet, clamshell bucket, tie grapple, timber tongs, rail tongs, pile driver, pile puller, pipe sling, back filler, or dragline bucket—and it is quickly and easily converted from a crane or dragline to a power shovel by simply changing booms. It is a real railway man's shovel.

NORTHWEST ENGINEERING COMPANY

1713 Steger Building, Chicago 4, Illinois

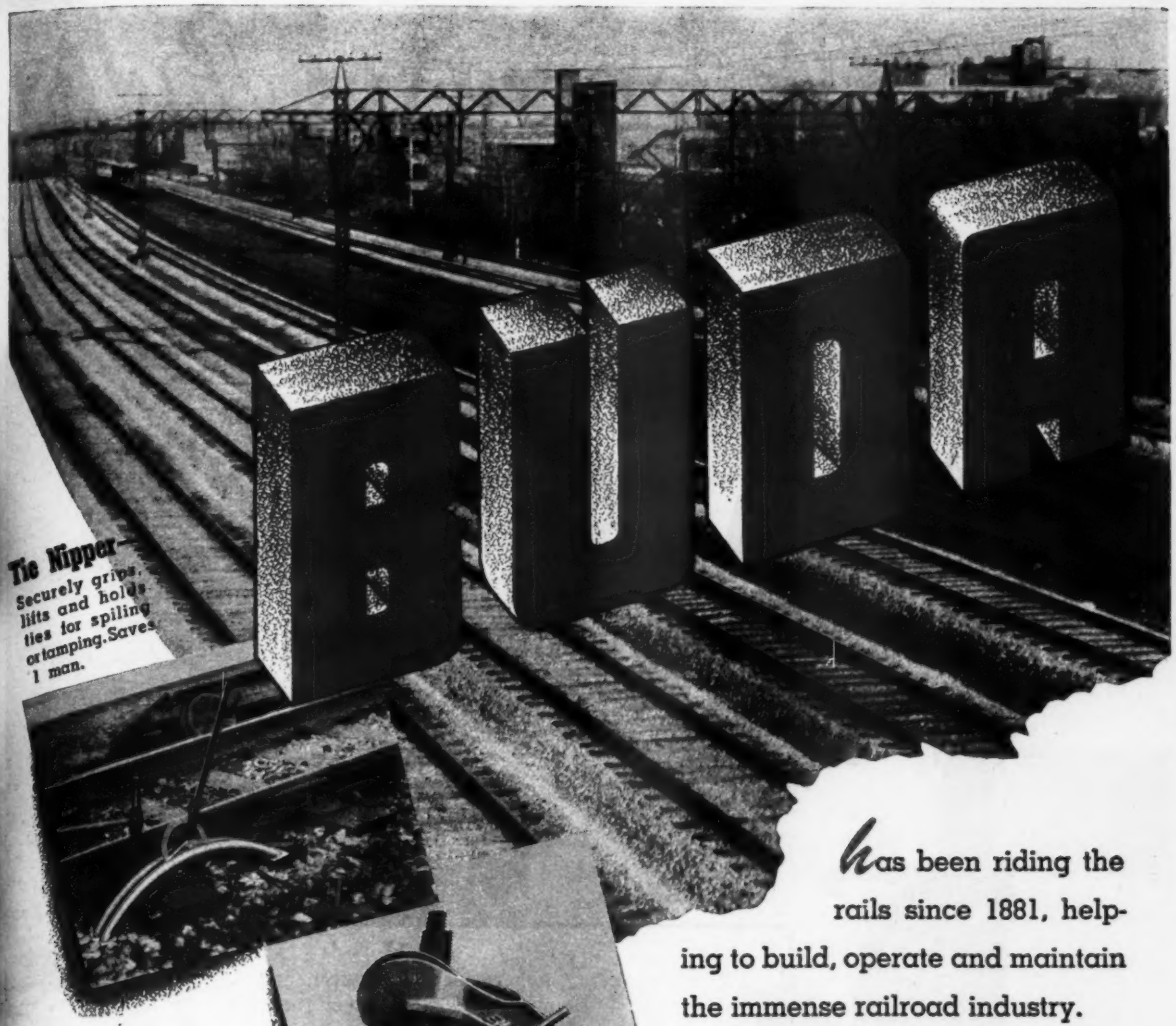
28 East Jackson Boulevard

NORTHWEST

THE ALL PURPOSE RAILROAD MACHINE

SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

PROVED on the nation's LEADING RAILROADS



Tie Nipper— Securely grips, lifts and holds ties for spiling or tamping. Saves 1 man.

Rail Bender— One man bends up to 151 lb. "T" rail without heating.

Track Liner— Three men align more rail than 11 men with aligning bars.

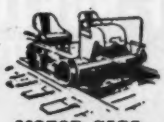
Track Jacks— Sturdy, durable jacks in many models speed up maintenance jobs.

has been riding the rails since 1881, helping to build, operate and maintain the immense railroad industry.

For more than 63 years the name BUDA has stood for dependable—efficient — economical railroad equipment, manufactured to the requirements set forth by modern railroad standards. Write or wire for bulletins.

BUDA

15403 Commercial Ave.
Harvey (Chicago Suburb) Illinois



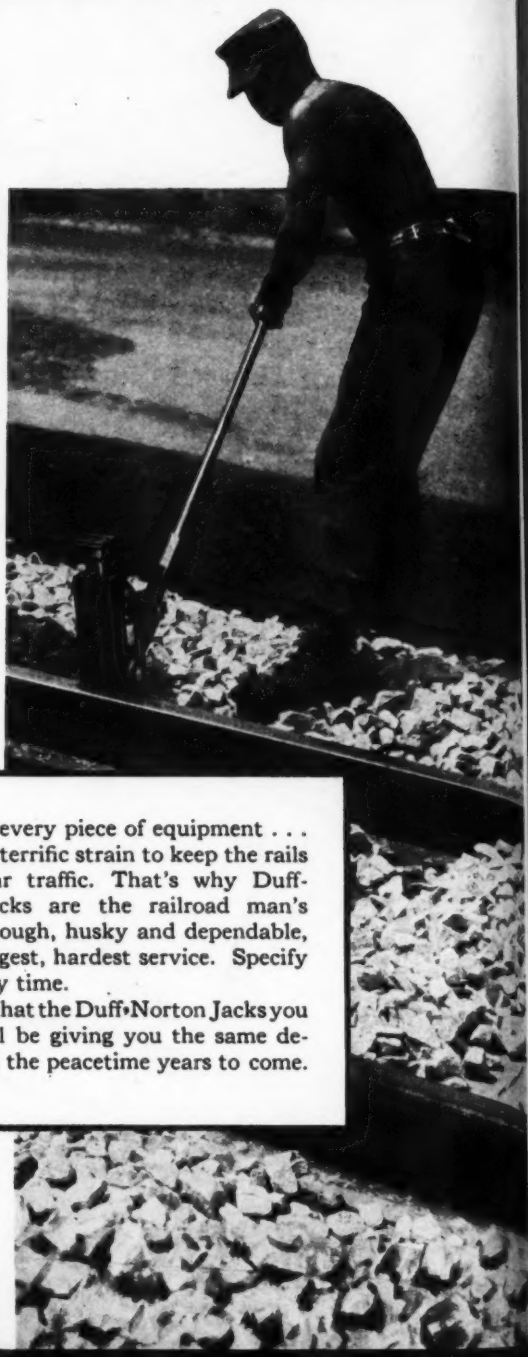
MOTOR CARS

PUSH CARS

Duff-Norton TRACK Jacks

They're built tough and husky to give you long service on your

TRACK WORK



Every worker . . . every piece of equipment . . . they're all under a terrific strain to keep the rails open for vital war traffic. That's why Duff-Norton Track Jacks are the railroad man's favorite! They're tough, husky and dependable, even under the longest, hardest service. Specify Duff-Nortons every time.

Remember, too, that the Duff-Norton Jacks you buy today will still be giving you the same dependable service in the peacetime years to come.

Write for Catalog 202... gives you complete application data, descriptions and specifications for Duff-Norton Jacks.

THE DUFF-NORTON MANUFACTURING COMPANY

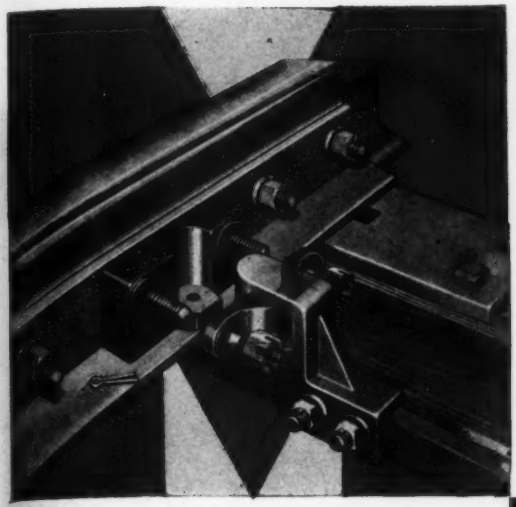
PITTSBURGH, PENNSYLVANIA

Canadian Plant: COATICOOK, QUEBEC

Representatives in Principal Cities

Choose RACOR TYPES M and MF SWITCH CLIPS

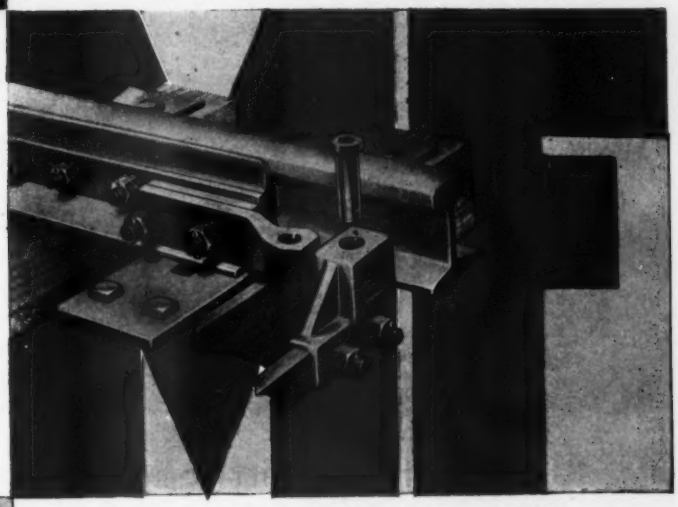
FOR LONG LIFE AND LOW MAINTENANCE



RACOR Types M and MF Switch Clips provide maximum life of switch points because they assure free swiveling, easy operation and prevent rolling of points.

Rugged in construction, easy to inspect and accessible for lubrication, Types M and MF Switch Clips reduce switch maintenance. They are machined to close tolerances and can be relied upon for exceptionally long service.

Correct point position, with respect to stock rail, is positive and point bearings can be tightened to



RACOR

RAMAPO AJAX DIVISION

230 PARK AVENUE NEW YORK, N.Y.

rails without affecting the action. They are particularly recommended for power-operated switches, but are applicable to any type of switch or switch rod.

Our representative will be glad to explain how Racor Types M and MF Switch Clips assure long life of switch points and minimize valuable maintenance time.

3664

Brake Shoe

HILLBURN, NEW YORK
NIAGARA FALLS, N. Y.
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Not a Very Smart Bird

Nor is it smart to ignore the tremendous toll taken by the neglect of weeds.

Each year the demand for chemical weed killer grows as engineers learn that only by destroying roots in the roadbed can a weed control program show cumulative benefits.

Unknowingly many railroads are ignoring the toll taken by weeds since this is scattered in track labor, general maintenance, and depreciation costs.

CHEMICAL WEEDING IS A NATURAL. Water soluble chemicals penetrate and reach roots. Application is simple, rapid, and cost per mile is low. One hundred miles per day is a frequent accomplishment.

Weed control is a science, a highly specialized business, unique in the chemical and railroad supply field. Sizable investment in research is bringing rewards and benefits to railroads.

REVIEW YOUR WEED CONTROL PROGRAM WITH A COMPANY THAT HAS PRODUCED CHEMICAL WEED KILLERS SINCE 1883.

Reade Manufacturing Company, Jersey City 3, N.J.

Plants at five railroad centers.

Save Tie Wear

THE P. & M. CO.

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HERE'S DRILLING POWER!

Thor PORTABLE AIR DRILLS

WITH THEIR COMPOUND GEARING, HIGHER TORQUE RESERVE AND STEADY POWER FLOW, THOR AIR DRILLS SPEED DRILLING & REAMING

A SIZE FOR EVERY JOB

IF YOU'RE LOOKING for *plus* performance in heavy-duty air drills — high torque, dependable power, easy control — *at no extra cost* — take a look at the new, improved Thor air drills!

THOR'S compact, one-piece construction of rotor and shaft provides deeper blade slots and wider blades — to deliver a *steady* flow of power! What's more — Thor Triple-Gearing means a reduction ratio that develops so great a Torque-Reserve that even the toughest jobs of drilling, reaming and tapping are speeded through.

And, this improved *performance* isn't all! In addition, both size and weight have been reduced by the use of aluminum cylinders and light-but-sturdy malleable iron housings. You get a speed governor that controls and *minimizes* air consumption, automatic lubrication, heavy-duty bearings — engineering features that give new highs in performance.

No. 33S-X
2" Capacity Rotary
AIR DRILL

41 MODELS of Rotary Air Drills for heavy duty service, with capacities up to 3" for drilling and 2½" for reaming and tapping, are available in the complete Thor line. They can be furnished in either Reversible or Non-Reversible types and in speeds to meet your exact requirements. Also available are Close-Corner drills for "hard-to-get-at" jobs.

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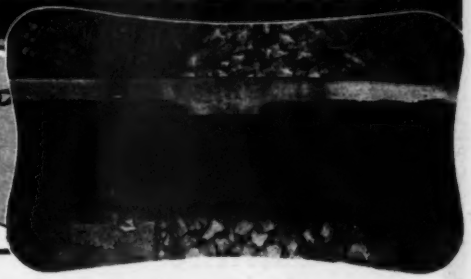
ADDRESS _____
CITY _____ STATE _____

How to repair wheel burns on rail...

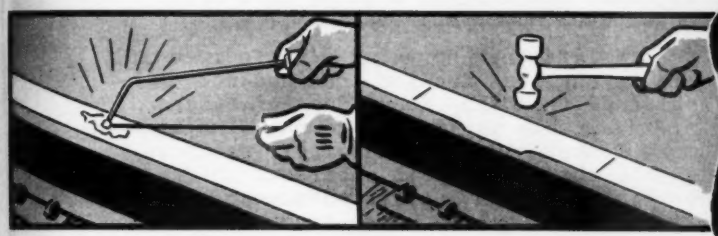
...by welding with Airco Railroad Rods

1. Remove loose and blistered metal by chipping with a hammer and chisel. Brush out cavity with wire brush.

2. Quickly wash out remaining refuse metal with Airco No. 9 or 10 bulbous type tip. This also anneals area around cavity.

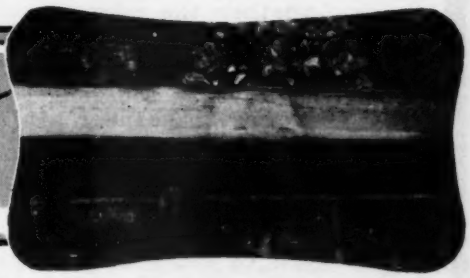


Welded rail-burn spot after being peened and flattened and restored to its original plane.



3. When cavity is cherry red, withdraw flame. Fissures will be instantly visible. If no fissure appears, fill in cavity by quickly welding with Airco R.R. rod.

4. Peen the deposit with hand hammer, and follow with grinder or flatter. No quenching or heat treatment of any kind should be used after building up.



This built-up burned spot has been in service for six months. Heat marks are barely visible.

This method of repairing wheel burns on rail is fast and inexpensive, costing from $.20 to $.40 for each spot filled. The procedure shown is applicable to most wheel-burn welding operations. However, if a shelled-out burned spot is over 3" long, the preferred method is to build it up in sections of 1½" to 2", allowing the rail to cool down between applications.

This welding maintenance method is typical of many flame and arc processes that are expediting today's track maintenance operations. For complete details on the best materials and methods to use—or for assistance in their application—write your nearest Air Reduction office.

★ BUY UNITED STATES WAR BONDS ★

AIRCO WILSON

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General Offices: 60 EAST 42nd STREET, NEW YORK 17, N. Y.

In Texas: MAGNOLIA AIRCO GAS PRODUCTS CO. • General Offices: HOUSTON 1, TEXAS

Offices in all Principal Cities

No. 185 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: "Can't Find Time to Read"

May 1, 1944

Dear Reader:

"I don't have time to read your magazine any more, I haven't even taken the last four or five issues out of their wrappers." This was the comment made to me by a subscriber a few days ago. It was so unusual that it set up a train of thought in my mind.

These are busy days—for all of us, but for none more so than for the railway maintenance officer. With the demands of wartime traffic more exacting than ever before; with large amounts of work pressing for attention and with materials and labor grossly inadequate, the problems are baffling. It is not surprising that one's time is fully occupied,—that the days are not long enough to permit one to do all that is required.

Yet the question arises whether one really saves time who foregoes reading the magazine dealing with his problems,—whether the very pressure under which he is working does not make his search of its pages even more important.

A person who refuses a lift when hurrying along a road is admittedly foolish, but is he any less foolish than one who passes up helpful hints gleaned from the experiences of others equally pressed, which are available to him in the magazine at his elbow? We receive many letters in these days telling us of the help that readers find in the information published in our pages, editorial and advertising,—such letters outnumber many times over letters like that quoted above. They lead me to urge you to study the contents of this and succeeding issues even more carefully than usual to insure that you miss no suggestion, no idea, that may point to a short cut that will help you accomplish more, in these difficult days.

Railway Engineering and Maintenance is not designed to entertain you—beyond the point where information concerning one's work is entertaining. We hope, however, that it is interesting—for the reason that it deals with the problems to which you give most attention. It features no glamor girls—no attractive scenery. Rather, it claims your attention because it brings to you information and ideas that pertain to your work and that you can utilize to aid you when the going is specially difficult.

In brief, we feel that in these days when the pressure is so great, no maintenance man can afford not to read his magazine. Are we correct?

Yours sincerely,

Elmer T. Howson

ETH:kw

Editor

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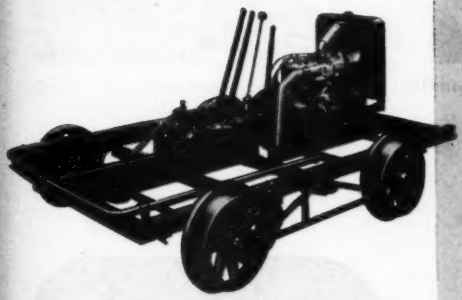

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Uniform placement of crushed rock with 1-2A Step-Cut.

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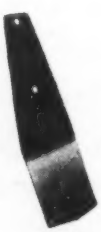

U-606

U-609

U-600

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Tampers
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ARE EFFICIENT IN ANY
LIFT AND ALL BALLASTS

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

MAY, 1944

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Railway Engineering and Maintenance

Land Grant Rates

Changing Conditions Demand Repeal

At the present time when the railways are hauling a larger volume of freight for the federal government, both in tons and in proportion of the total being moved, land grants and land grant rates assume an importance and a menace to the railroads never before experienced. As such, they are of direct concern to every railway employee and warrant his consideration.

Land grants date back three quarters of a century to the period when the national government was desirous of placing settlers on the vast areas of unsold and unoccupied public lands in the central and far western states. Obviously, these lands were of negligible value until such time as they were made accessible by railroads. Realizing this fact, the government offered certain portions of this land to those railroads which would build lines into these areas. In spite of the fact that the construction of these early railroads made it possible for the government to dispose of the remainder of its lands to settlers at markedly higher prices, the government exacted a further concession from the railroads in the form of a reduction in the tariff rates for the transportation of its properties. This reduction has been in effect through all these years—and its influence has not been confined to the roads which received land grants, for competing lines have been forced to make the same concessions to secure a share of the traffic.

In spite of the modification of the provision of land grant legislation in 1940 to exclude mail and certain other commodities and to confine these deductions to military and naval freight and to movements of the government's armed forces, the volume of these movements has become so tremendous of late as to make exceedingly serious inroads on the revenues of the railroads. This is shown by the fact that while the reductions in freight payments due to land grant rates in all the years prior to 1941 are estimated to have aggregated 220 million dollars, the deductions during the last 3 1/3 years alone exceed 540 million dollars and they are now running at the rate of 20 million dollars a month. The extremely serious effect of these deductions on individual roads is shown by the fact that they cost the Santa Fe railway alone approximately $40,000,000 last year, without including $9,000,000 more in disputed claims.

These serious inroads on their revenues are impelling the railroads to seek the repeal of all land grant legislation and bills to bring this about are now before Congress. In support of their contention, the railways are pointing out that their deductions are continuing long after any original indebtedness has been repaid many times over. They emphasize further that common equity demands that burdensome contractural relationships established three quarters of a century ago be reviewed in the light of present day conditions to eliminate burdensome hardships and restore fair relationships between all parties. The injustice is all the more marked by reason of the all-out performance of the railways in the present war emergency—a service that has been rendered without hesitation or quibbling. In the light of such a record, the government should be the first to correct an injustice, especially when the means are within its own power.

Railway employees can do much to correct this long standing injustice by familiarizing themselves with the facts and by then seeing that others among their acquaintance are given the same information.

Weed Destruction—

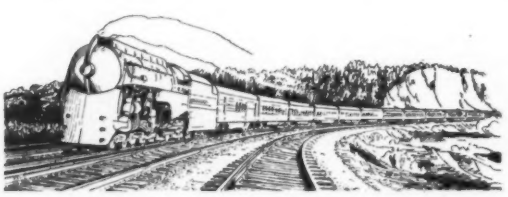
Chemicals and Oil Present a Problem

THERE is serious concern among maintenance men that, unless something is done about it, weeds will get the upper hand in thousands of miles of their tracks during the coming months, fouling the ballast, retarding drainage, hastening the decay of ties, and fostering serious difficulties in general track maintenance. This is brought about by shortages of both chemicals and oil, which even last year restricted severely the most effective and commonly used methods for controlling weed growth in the track structure—chemical spraying and burning. First to be restricted were chemical methods of control because of the demands of war and agriculture for the chemicals involved, particularly arsenic. Subsequently came restrictions in the use of oil for burning, restrictions which curtailed the operation of the many weed burners owned by the railways—and the situation as regards both chemicals and oil has not improved.

So serious are the potential consequences of this situation that it demands the attention of every track maintenance officer. In the first place, it is essential that they program their weed killing work to the best possible advantage, confining it to those territories and to those spots where it is needed most urgently. In addition, it is incumbent upon them to devise and adopt other ways and means of reducing chemical and oil consumption, and to get the maximum results from the materials that become available

In this latter regard, these men should not overlook a bulletin issued by the government on the burning of weeds, which makes suggestions in the interest of conserving oil. Likewise, they should not overlook the article in this issue entitled, New Burning Method Speeds Weed Destruction, reporting weed burning tests on the Northern Pacific, which tend to substantiate the facts pointed out in the government bulletin referred to. Outstanding among these facts, and one which, incidentally, is in conflict with past practice on many roads, is that light searing alone is more effective in weed destruction than complete burning, the former setting up chemical reactions in the plant which discourage future growth, while the latter tends to stimulate subsequent growth by throwing all of the elements of plant life back into the roadbed. In substance, this suggests that equally effective results in burning can be secured by more rapid movement of the burner over vegetation, reducing the amount of oil consumed per mile of track covered, and this appears to be substantiated by the tests conducted on the Northern Pacific, which demonstrated that burner operating speeds of seven to eight miles an hour produced the most satisfactory results—in fact, just as effective results as when the burner was operated at speeds of four to six miles an hour.

While the tests referred to cannot be construed as all-inclusive, or proof that the method will be equally effective in the case of all classes and conditions of weed growth, the probability that the new theory holds elements of truth under most conditions, if it is not correct in its entirety, suggests that maintenance men should investigate it carefully under the conditions that prevail on their respective roads, if this has not already been done. They should also not overlook the added factor pointed out in the report presented before the recent annual meeting of the American Railway Engineering Association, by a subcommittee of the Committee on Economics of Railway Labor, dealing with means of meeting the current shortage of chemicals and fuel oil for the destruction of weeds, that to secure the most efficient control of weeds by burning, attention must be given to the character of the oil employed. This report points out that oils heavier than U.S. Bureau of Standards No. 3 oil, which is the grade recommended by most manufacturers of weed burning equipment, do not give the complete combustion and high heat required for efficient and economical weed destruction.



Carelessness—

Accounts for Most Personal Injuries

IT cannot be emphasized too often or too strongly that practically all personal injuries that occur in railway service are avoidable. It has been said, and records confirm the truth of the statement, that 90 per cent of these accidents result directly from carelessness and that carelessness is an important factor in almost all of the remaining 10 per cent. Inattention, absentmindedness, readiness to take a chance where this course will increase the hazard, neglect to do the thing that assures safety, taking the wrong action in a situation that may be fraught with danger and assumption that no hazard exists, are all specialized forms of carelessness which, sooner or later, are almost certain to lead to serious accident.

A case in point is described on a later page in this issue, of a head end collision between a motor car and a freight train, in which three men lost their lives and three others were injured. Because of the hazards involved in the operation of a motor car in this territory, a portable telephone had been assigned to the gang to permit communication with the dispatcher. The dispatcher had been consulted before the trip was started and had informed the foreman that there would be no train for approximately two hours.

Acting on this information, the foreman neglected to provide flag protection where the view was obstructed, although required specifically to do so by both the operating and safety rules. In extenuation of his action, the foreman stated that in addition to the information given by the dispatcher, he had relied to a considerable extent upon the fact that fire in a tunnel about 20 miles to the east had caused practical discontinuance of train movements temporarily. It also developed that there had been some interference on the dispatcher's telephone circuit at the time the foreman inquired about trains, and the dispatcher believed that he was talking to a section foreman about 25 miles west of the point from which the bridge foreman called. Without making certain to whom he was talking, he gave information that would have been

correct for the section foreman, but was not for the bridge foreman.

This was a clear-cut case of assumption on the part of the foreman that no hazard existed; of neglect on the part of the dispatcher to make certain to whom he was giving information; and neglect on the part of the foreman to take precautions prescribed for the alinement conditions on this section of track. Although the carelessness exhibited in this case was no more flagrant than in many others that might be cited, the several causes and the manner in which they combined to produce the final result, make the connection between cause and effect somewhat more obvious than it is in some cases.

After considering all of the factors leading up to this accident, the Interstate Commerce Commission issued this simple and clear-cut verdict which went to the heart of the matter, "This accident would not have occurred if the movement of the motor car and trailer had been made in accordance with the rules." Only close supervision and constant vigilance will prevent others that are equally serious.

High School Boys—

Back the Program for Their More Extensive Use

MANY factors are working to mitigate the serious manpower shortage which confronts maintenance of way and structures forces, and while all of them hold promise of some help, the two which appear the most promising are the importation of Mexicans and the employment of high school boys during their summer vacation period and other off-school days. For a time early last year, due to difficulties in negotiations with the Mexican government and the attitude on the part of some railway men, it appeared that few Mexican Nationals would find employment on the American railways, except possibly in the Southwest and Pacific Coast area. Subsequently, however, this situation changed materially, and the way has now been opened for the importation of 40,000 Mexicans, while the requests of the railways for these men have totaled more than double that number. At the present time, Mexicans have been allocated to 29 roads scattered widely over the country, including lines as far from the Mexican border as the Boston & Maine, with the prospect that the entire 40,000 men will be at work at the peak of the summer season.

In view of these facts, it is evident that the railways are now planning to make the most of the possibilities for relief from their manpower shortage through the employment of Mexican Nationals. The question may be raised, however, whether they will take equally full advantage of the possibilities for relief through the employment of high school boys. It is true that several thousand high school boys were employed in track work and related operations on the railways last summer, the Milwaukee alone having had more than 1300 such boys on its payrolls, but the number of boys that were employed by many other roads was far from impressive, and indicates that the surface was only scratched, compared with the full possibilities for constructive work from this source. It is a matter of record that while some roads employed school boys with complete success and satisfaction last year, other roads in the same general territories showed little or no interest in their employment, or, for one reason or another, had little success in the use of the boys whom they did employ.

Convinced, as many railroad men have been that, under proper conditions and supervision, high school boys can prove a large factor in meeting the labor needs of the maintenance forces, the Railroad Retirement Board is conducting a promotional and educational program looking to the far more widespread employment of boys by the railroads during the present year. Under this program, which is being conducted by representatives of its various offices, it is contacting railway officers and state and local school authorities to inform them of the plan and to solicit their interest in it. These efforts are being supplemented by poster and bulletin campaigns in high schools throughout the United States, and by the use of motion pictures, which show the work, housing and boarding facilities and social activities of groups of boys employed in track work on several roads during the 1943 season.

Based upon experience in the use of boys last year, the Retirement Board's program sets a high standard for their employment during the current year. Among other things, this program calls for consideration to the following factors: Segregation of the boys from older men on the job, insofar as possible; the provision of clean, sanitary bunk cars for the use of the boys alone, with shower baths and electric light; the establishment of a "monitor" plan, providing for the supervision of the boys during their off-duty hours by a responsible, experienced monitor, such as an athletic coach or school teacher, who is placed on the payroll of the railroad; reasonable boarding charges; careful attention to the dietary requirements and food preferences of the boys; work locations where the boys can indulge safely in off-time recreation, and preferably outside of congested terminal areas; the employment of boys within 100 to 150 miles of their homes to avoid homesickness and turnover; daily bus or similar transportation to and from home for those working within a radius of 20 to 25 miles from their home locality; the furnishing of athletic equipment for evening and Sunday recreation; and the avoidance, insofar as possible, of heavy or dangerous work.

This constructive program on the part of the Railroad Retirement Board is to be commended, and deserves the whole-hearted co-operation of every maintenance of way supervisory officer in his own selfish interest. With that co-operation, the railroads will be assured of hundreds of thousands of added man-days of constructive labor during the current season, in bridge, building and water service work, as well as track work, while at the same time affording the most healthful and constructive occupation for thousands of boys in every section of the country during their free-school periods.

Bridge

Above—Two of the Three Shop Buildings at Port Jervis —Note Storehouse in Center Background and Tool Repair Shop in Right Background

Below — The Stacked Material in the Foreground Consists of Finished Parts Ready for Shipment. About 50 Per Cent of This Is Reclaimed Material

AN important factor in helping the Erie to cope with wartime material shortages in carrying out its bridge maintenance, repair and strengthening programs is the system bridge shop which this company maintains at Port Jervis, N. Y. Completely equipped to perform any type of metal fabricating work that may be required in keeping up or reinforcing the company's bridges, this shop, which has been in existence for a number of years, has been readily adapted to the reclaiming or reworking of second-hand steel on a large scale, thereby reducing to a minimum the amount of new steel required. At the present time, it is estimated that approximately 40 per cent of the steel that is being applied in the company's bridge programs (exclusive of a special project requiring 260 tons of new steel) consists of material reclaimed from old bridges, many of which have been made available as a result of line abandonments.

History of Shop

The bridge shop at Port Jervis had its origin many years ago, but for some time after its inception its activities were on a limited basis. Originally, the facilities were housed in several box cars, for at that time it was necessary occasionally for the organization to perform work in the field. In 1926, however, a start was made toward the establishment of a permanent shop by the construction of a small building of steel covered with corrugated iron which housed a blacksmith's forge and various tools. Even then, the work was largely performed by hand methods and tools, and the operations were confined for the most part to the reworking of second-hand material on a comparatively limited scale.

In 1928, the railroad undertook an extensive program involving the strengthening of many of the steel bridges on its main line between Jersey City, N. J., and Marion, Ohio, supplementing a strengthening program started in 1916, to render these structures capable of carrying heavier locomotives. This was accomplished by reinforcing the bridges as necessary by the application of new steel to the over-stressed members, the fabrication of which constituted a large-scale operation extending over a period of years. Shortly after this program was undertaken, the railroad, in recognition of the many advantages to be gained thereby, enlarged its Port Jervis shop by the construction of additional structural shop buildings and trackage, and also modernized it by installing various types of power tools and other equipment needed in performing the cutting, drilling, punching, riveting, welding and other operations involved. For the most part the steel required for the strengthening program was acquired new, and second-hand material was used only to a limited extent. In addition to the working of steel required in the bridge-reinforcing program, the shop continued to turn out fabricated members and parts for miscellaneous regular and emergency bridge repairs.

Extended Program

When the strengthening of the bridges between Jersey City and Marion had been completed, the program was extended successively to other parts of the system and is still under way. In fact, the reconditioning and strengthening of the bridges in the section between Marion, Ohio, and Hammond, Ind., was completed in 1943. This work, together with the railroad's regular bridge-repair activities, obviously requires substantial amounts of steel in the form of plates and shapes. Hence, the shortage of steel that developed following the outbreak of the war threatened to curtail or delay the work, but the railroad found that it had an effective answer to this problem in its bridge shop at Port Jervis. That is to say, this shop, being thoroughly equipped and experienced in the fabrication of bridge steel, was fully prepared to undertake the reworking of second-hand steel on a larger scale to make up for the lack of new material. Since line abandonments were taking place on an

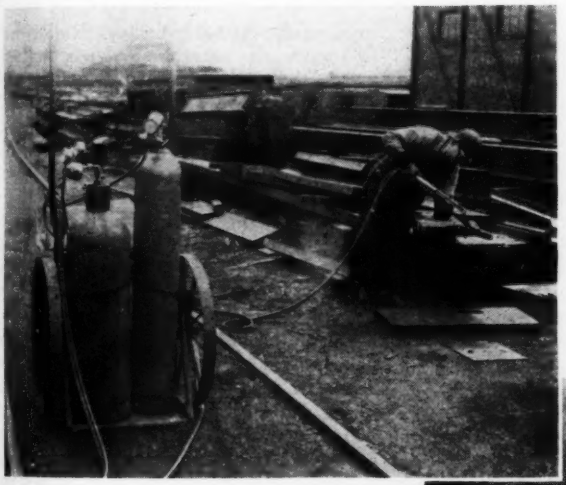
Shop on the Erie Proves Worth in Wartime

For some years this company has maintained complete facilities at Port Jervis, N. Y., for fabricating the steel required in carrying out its bridge repair and strengthening programs. Since the outbreak of war these facilities have been devoted to an increasing extent to the reworking and reclaiming of second-hand steel, in which capacity they are proving exceedingly valuable in helping the road carry on its regular bridge programs in the face of the severe steel shortage

increasing scale, it was evident that the bridges released from such lines would supply a considerable quantity of second-hand material for reworking at the shop. A further factor contributing to the wider use of sec-

of the engineer of structures, whose office is at the railroad's headquarters at Cleveland, Ohio. It is this office that determines, on the basis of inspection reports, stress investigations and other considerations, what disposition is to be made of railroad and highway bridges that are released from service, either because of line abandonments or the retirement of structures carrying operated tracks, or for other reasons.

If a released bridge in its entirety is considered unfit for further service, or if certain parts of it are considered unsuitable for further use, these bridges or parts are sent to the road's reclamation plant at Meadville, Pa., to be cut up for scrap. If parts and whole bridges are in reasonably good condition, and otherwise suitable for further use, they may be stored at the site or at Port Jervis until an opportunity is presented for returning them to service, either in the original state or reworked as necessary. It frequently happens that at the time a bridge is removed from service, plans have already been made for reworking it, and in this event it may be shipped to the Port Jervis shop for reconstruction, or, if conditions permit, the span may be reworked in the field by one of the company's system bridge gangs.



Left—Cutting a Channel With a Portable Oxy-Acetylene Outfit. Below—This Air-Operated Bending Press in Use at the Shop Was Built Entirely of Second-Hand Material

Old Webs Widely Re-Used

It is thus apparent that the reclaiming of second-hand bridge steel may be accomplished at the shop either by

ond-hand material is the increasing application of welding in bridge fabrication and field application, as the use of this process simplifies the reworking of old steel, as well as the application of new steel to existing bridges.

All activities involved in repairing, strengthening, removing and re-erecting steel bridges, turntables, and all other steel structures on the Erie, including those of the shop at Port Jervis, come under the jurisdiction

reconstructing the old spans for further use more or less in their entirety or by reclaiming parts of them for use in repairing or reinforcing existing bridges. With respect to the latter phase of the work, the road has found that plates cut from the webs of old girders are adaptable to a wide variety of uses. The items that can be made from old webs include connection or gusset plates, floor plates, patch plates for application to girder webs and flanges that have been weakened through loss of section, diaphragms, and shim plates for insertion under bridge bearings when the spans are raised or the bearings are improved. Sections cut from old webs are also installed to replace worn plates in track hoppers and storage pockets at coaling stations. Other parts of girder spans that are reclaimed are the angles in the lateral bracing, of which those parts not punched are suitable for a variety of uses.

Second-hand truss bridges seldom yield much re-usable material except the material in the floor beams and the tension rods in the truss. Sections cut from the webs of the floor beams are reclaimed for about the same purposes as those obtained from girder webs. If of sufficient length, tension rods may be used to reinforce or replace defective rods in trusses of bridges still in service. Otherwise they may be reworked into anchor bolts, hook bolts or concrete reinforcing. Such rods may also be turned over to the car repair shops for use as truss rods under cars. In turn, certain items, such as second-hand channels and other material obtained from dismantled cars by the car department or the scrap reclamation plant, are reclaimed for various uses in bridge and other repairs. In all cases involving the re-use of reclaimed material, the work is done in accordance with plans prepared in the office of the engineer of structures, which not only serve to define definitely the scope of the repairs to be made, but also serve as records of changes made.

The Shop Described

The shop at Port Jervis is a completely self-contained unit embodying all the facilities required in performing its function, and the area that it occupies, containing considerable space for the storage of new and second-hand material on well-prepared and arranged skids, is served by a number of tracks. Among the facilities are three steel shop buildings, including the original unit, which contains a blacksmith's forge and various tools, and a larger building, covered with corrugated zinc, which houses an electrically-operated power press for punching rivet holes, various other tools, and a steel plate bench on which patterns for steel fabrication are laid out. The third building, which is open on one side, and partly open on two sides, with the balance covered with corrugated iron, houses an electrically-operated power press for shearing steel. Incidentally, the three shop buildings are constructed almost entirely of reclaimed material.

Punching a Plate With the Motor-Operated Press in the Larger Shop Building

Ordinarily, much of the cutting, welding, riveting and other work performed at the shop is done outdoors, but during inclement weather such work may be done under cover, and for this reason the larger and open-shed type buildings were made of sufficient size and are of suitable construction for this purpose. The three buildings are in line with each other and one of the tracks serving the yard extends through the two enclosed buildings and alongside the open shed, thereby making it possible to move material in the process of fabrication about on push cars. If necessitated by emergency conditions, outdoor work, as well as indoor work, may be carried on at night with the aid of flood-lights placed at strategic points in the yard.

As already mentioned, the shop is equipped with a complete complement of appropriate tools and devices. These include, besides those mentioned, an Airco Radiagraph for cutting members automatically to given patterns; a portable, 3-phase 60-cycle, 220-440-volt arc-welding machine, also adaptable to field use where current is available; jacks varying in capacity from 15 to 100 tons; a pedestal grinder for sharpening tools and grinding bridge parts to accurate measurements; a blacksmith's forge and portable forges for heating rivets, which may be moved about as desired; anvils and bending forms; and a range of small tools, such as riveting guns and busters, chipping hammers, portable power grinders with brushes, and pneumatic drills and wrenches. It is interesting to note that many of the large tools at the shop are units that have been discarded by various car and locomotive repair shops on the road.

Other Equipment

The power press in the larger shop building is a single-head motorized machine capable of punching holes up to 1 in. in diameter in 7/8-in. material. The power press in the open shed is of similar construction except that it is equipped with shears. Roller conveyors of various designs facilitate the handling of members through these machines, and, in addition, a number of hand-operated chain hoists of from one to three tons capacity, with trolleys operating on overhead beams, are provided in strategic locations in the large shop building to facilitate the handling of steel. Still another piece of equipment at the shop is a power bending press, constructed entirely of second-hand material, that is actuated by two old cylinders from a steam locomotive, which are driven by compressed air. Incidentally, compressed air outlets for operating tools and forges are located at various points throughout the yard. The compressed air for the shop is supplied from a central compressor plant which also serves an adjacent car repair shop.

A unit of equipment that is used intermittently at the shop is a 60-ton capacity self-propelled steam locomotive crane. Although this crane is assigned to the department of structures for handling heavy bridge erection and removal jobs on the system, and is available for use either at the shop or in the field as needed, it is also used when available in handling heavy freight shipments for the transportation department, being in par-

ticular demand at this time for handling war materials, including steam locomotives for export.

Aside from the three buildings mentioned previously, other structures at the shop include two retired units of passenger equipment, one of which, a coach, serves as a shop office, while the other, a dining car, is fitted with beds, and cooking and feeding facilities for the use of shop men living out of town. A stores building, built of "fit" material that had been released as scrap, contains all sorts of supplies for both the shop and field forces of the department. Also, an old box car is used as a repair shop, in which major repairs are made to tools used by both the shop and field gangs, and in which turntable parts, such as end wheels, axles and bearings and center pivots, are given minor repairs and reconditioned. This car is equipped with facilities suitable for its purpose, which include a vibrating-reed-tachometer for testing the efficiency of air-operated tools. An experienced tool mechanic handles the work in this shop. He also visits the various bridge crews on the road for the purpose of servicing and making light repairs to tools and equipment on the jobs.

Riveting Steel Plates Together to Form a Bridge Bearing

Organization

One of the railroad's eight system bridge gangs is stationed permanently at Port Jervis to operate the bridge fabricating shop. At the present time, this gang consists of a foreman, an assistant foreman, seven shop men, and one man who is assigned to the office to handle the clerical and storehouse work, and telephone calls between the shop and headquarters and other points. The foreman of this gang is also in charge of the storehouse at the shop. Since all members of the shop organization are thoroughly experieiced bridge men, they are on occasion used on the line, especially during emergencies.

As already noted, all work at the shop is performed in accordance with plans prepared in the office of the engineer of structures. In submitting job orders to the plant, a system of priority designations is used to indicate the degree of urgency attached to specific projects. Finished jobs, whether they consist of one or more single members or complete spans, are identified by numbers corresponding with those of the bridges into which they are to be inserted, in addition to the erection marks as shown on the detail drawings. In order that the office of the engineer of structures may be kept advised of the progress made on various projects at the shop, a weekly report is made to that office showing the completed jobs that are being held for shipping orders, the jobs that were completed during the week, the completed jobs that were shipped during the week, and the unfinished jobs on hand and their current status. Also, the shop and the Cleveland office are in frequent touch with each other by telephone, and on occasion it has even been the practice, in urgent situations, to transmit instructions for fabrication by telephone.

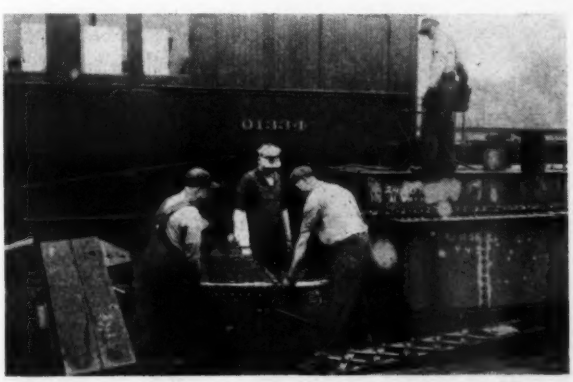
Records Are Kept

In addition to the second-hand material that may be on hand at any given time, the shop maintains a stock of new plates, angles, beams and other shapes. Through the agency of a perpetual stock list furnished by the shop, the Cleveland office is kept advised at all times of the nature, sizes and amounts of material on hand. When second-hand material is received, whether in the form of complete spans or individual members, a report is submitted by the shop, giving complete details of the material and its condition. When detail drawings are made by the Cleveland office covering work to be done at the shop and calling for the use of second-hand material, exactly what used material is to be reworked for the particular job is indicated on them. Such material, therefore, disappears automatically from the stock records of the Cleveland office.

Reports showing the sizes and amounts of new material on hand, as well as certain second-hand items, are submitted to Cleveland every two weeks by the shop. These reports cover the regular stock of structural material, rivets, bolts, electrodes, etc., as well as any new materials that have been received for specific jobs since the last previous report was made. They also cover the second-hand I-beams and channels that are available at the shop. These items include a variety of wide-flange beams, which were acquired originally for a large falsework job, and which are still being used repeatedly for this purpose and for permanent work when practical use can be made of them. For identification purposes, each of the beams in this inventory is numbered. A complete report is made once each year of all the material, both new and second-hand, available at the shop.

All scrap material produced at the shop in the punching, drilling, chipping, and cutting operations is graded and sent to the company's reclamation plant for disposal. However, it has been found that punchings make ideal ballast for counter-weighting cranes,

(Continued on page 444)



Riveting Up the Base of a Column That Is Being Reworked

Laying One of the 78-ft. Rails. Note the Spreader Rig by Means of Which the Long Rail Is Lifted at Two Points

Jersey Central Lays 78-ft. Rails in Two-Mile Test Track

Desiring to determine what advantages may be derived through the use of rails longer than the present standard, the Central Railroad of New Jersey has installed a test track with 39-ft. rails welded in pairs. This article describes the test section in detail, including several variations in construction, joint spacing, etc., that were employed to determine their relative effectiveness for use with the long rails

A TWO-MILE section of test track embodying 78-ft. rails formed by butt-welding 39-ft. rails in pairs, has been established by the Central Railroad of New Jersey in a heavy-traffic main line. Primarily, the purpose of the test is to determine to what extent, if any, such construction leads to economies in track maintenance and whether it promotes improved riding conditions. It is desired also to determine if standard fastenings and track construction are adequate for use with the longer rails, and which of several practices regarding joint spacing, expansion allowance, and anti-creeper arrangement give the best results.

The section of track chosen for the test installation is located in the company's westbound passenger main between Jersey City, N. J., and Bayonne, which is one of four main tracks in this territory. This track also carries many eastbound movements, especially commuter trains inbound to Jersey City during the morning rush hours. Likewise, considerable freight traffic is handled over this track, some of it also in the eastbound direction. Except for a 1-deg. curve near the middle, the test track is on tangent. Prior to the installation of the long rails in December, 1943, the track construction in this territory consisted of 39-ft. 130-lb. Headfree rails, which had been in service 12 years, 39-in. six-hole anglebars, double-shoulder tie plates, creosoted ties and crushed stone ballast.

The new rails that were applied in the test track are likewise of the 130-lb. Headfree section, and are controlled-cooled. These rails were rolled in the standard 39-ft. lengths and were joined into 78-ft. lengths by the railroad, using the Oxweld automatic pressure rail-welding process. As obtained from the mill, the rails were drilled at one end only, and the opposite, or blank, end of each rail was squared up at the mill, with the result that it was only necessary to subject the end faces to a buffing operation to remove dirt and scale in preparing them for welding.

The work of welding the rails was performed at a point about 1½ miles from the test track. For transporting the 78-ft. lengths to the site of installation, which work proceeded concurrently with that of welding the rails, a 65-ft. drop-end gondola car was used, to which was attached a flat car for supporting the protruding ends of the long 78-ft. rails.

Construction Details

A self-propelled steam-driven locomotive crane with a 52-ft. boom was used for loading, unloading and transporting the rails. Because of the flexibility of the long rails, the use of a single line attached at the middle would not have been practicable for handling them. For this reason a "spreader" was attached to the lift line of the crane, consisting of a 24-ft. section of rail with a pair of rail tongs fastened at each end. This rig was also used in the rail-laying operation. Incidentally, in handling the long rails, the crane lift line was centered over the butt-weld, and it was not necessary to mark the rails to indicate the positions for fastening the tongs.

Except for the long rails, the test

track embodies conventional construction and fastenings, although, as indicated earlier in this article, the construction was varied in certain respects between different parts of the test section to determine the most effective practices. Elements of the construction include six-hole 39-in. angle bars and new 7½-in. by 13¾-in. double-shoulder tie plates, canted 1 in 20 with smooth bottoms, each of which was placed with two line and two hold-down spikes. Each tie plate is also punched with two holes in such a position as to permit driving the spikes against the toes of the angle bars rather than in the slots.

Arrangement of Joints

In the easterly half of the two-mile section, the welded and standard joints are staggered with respect to each other in the same manner as where all joints are bolted; that is, each bolted joint is 19½ ft. from the nearest bolted joint in the opposite rail. In the remainder of the test section (the westerly mile), the welded and bolted joints are placed directly opposite each other, i.e., the welded joints in each rail are directly opposite the bolted joints in the other rail and the bolted joints are evenly staggered with respect to each other, being 39 ft. apart.

Likewise, two different policies were employed in determining the expansion gaps at the bolted joints. In the easterly mile, the rails were laid with expansion gaps 1½ times those that would have been standard for 39-ft. rail at the prevailing temperature. In the westerly mile, on the other hand, the rails were laid with the same expansion gaps that would have been allowed for rails of standard length. Specifically, joint gaps of 5/16 in. were allowed in the easterly half of the test section, and of 7/32 in. in the westerly half, the latter being the standard for 39-ft. rail under the temperature that prevailed, which was in the range of 25 deg. to 50 deg. F.

Rail Anchorage

Throughout the two-mile section, a uniform amount of anchorage for the rail was provided, consisting of 32 Improved Fair anti-creepers applied against westbound traffic and 24 against eastbound traffic, in each 78-ft. panel. Here again, however, two different systems of arrangement were used. In the easterly 1½ miles of the test section, the anchors in both directions are distributed more or less evenly throughout each panel. This system, in other words, is used throughout that portion of the test track where the bolted and welded joints are staggered with respect to each other, and for half of that portion where the two types of joints are placed directly opposite each other.

For the remaining length of the test track (the westerly half mile), the anchors in both directions are concentrated at the centers of the 78-ft. rails; that is, they are placed in groups directly opposite the bolted joints. This means that half the anchors for each rail length are placed against consecutive ties on each side of the welded joint. The number of rail anchors applied, incidentally, is only slightly larger than the number that is normally used on this road in track with 39-ft. rail.

Laying the Rails

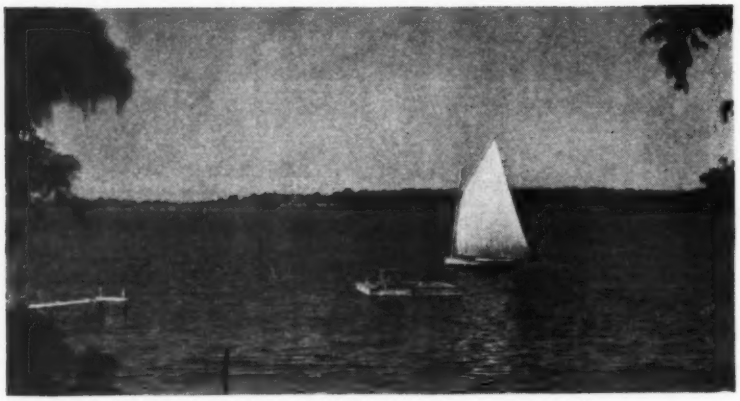
The work of relaying the rails was performed by a gang which, in size (108 men) and organization, varied in only minor respects from the gangs that are used on this road to lay rail of standard length. The use of a spreader rig, incorporating two pairs of tongs, in connection with the rail-laying crane has already been noted. Hence, it was necessary to have two men, instead of one, for handling the rail tongs. Because of the lengths of the rails, the tong men and the two men at the ends were assisted in guiding them into position by members of the crew engaged in the temporary gaging and spiking of the rails. On the other hand, there was a decrease in the number of men engaged in the work of applying and bolting up the angle bars and in placing the signal bonds.

The work of laying one line of rails in the two-mile section was completed in one working day, but two days were required for the other side because of inability to obtain use of the track for a sufficient length of time the first day. The project required the laying of a total of 270 seventy-eight-foot rails, which are continuous throughout the two-mile section except at a number of insulated joints where it was necessary to install 19½-ft. or 39-ft. rails to permit the joints to be located within the desired limits.

In laying the rails, the welded joints were allowed to fall in hit-or-miss fashion with respect to the ties, but wherever such a joint fell on a tie an oxy-acetylene torch was used to cut a hole in the tie plate to accommodate the slight bulge of up-set metal under the rail base. After all the rail had been laid, the test section was surfaced out-of-face, being given a lift of 1½ in., and in connection with this work the ties were respaced as necessary to place each weld midway between two ties.

The section of test track described in this article was installed under the general direction of S. L. Mapes, engineer maintenance of way, and under the direct supervision of T. E. MacMannis, division engineer, and T. F. Langan, supervisor of track, all of Jersey City.

Right—Close-Up View of a Welded Joint. Below—Showing a Section of the Track Where the Bolted and Welded Joints Are Staggered With Respect to Each Other



Small Lakes Present Few Problems, But Storms and Currents Sometimes Cause Trouble in Large Lakes

Maintaining Sources of

By C. R. Knowles
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NATURAL sources of railway water supply include lakes, ponds, streams and springs, as distinguished from artificial supplies such as wells and impounding reservoirs. The problems involved in securing water from natural sources and impounding reservoirs are, in general, different from those involved in securing water from wells, which will be discussed in a succeeding chapter.

Where the supply is obtained from a natural body of water, there are certain requirements that are peculiar to each type, and in many instances to the individual supply. The maintenance of such supplies sometimes presents difficult problems, particularly in streams subject to wide fluctuation between high and low water levels, or where the streams carry much mud, sand and debris; and where water is pumped from the larger bodies of water, such as lakes, where they are subject to high winds which cause much intake trouble. Again, lakes give rise to considerable trouble from ice formation in the colder climates.

Constant vigilance and thorough knowledge of conditions that may cause interruption or failure are necessary to avoid interference with the continuity of supply. Intake sumps, screens, pipe lines and other facilities essential to the delivery of water to the pumps, require frequent inspection and such maintenance as will avoid any possibility of failure.

Streams

Small streams that maintain a fairly uniform stage of water at all times, if reliable in supply, present few difficulties in the operation of pumping stations. The intake facilities are usually confined to suction lines from the stream to the pumps; however, there are certain essentials of good maintenance that should not be neglected with even the most simple form of pump intake that will be discussed under suction lines. On the larger streams where the stage of water varies beyond the limits of ordinary suction lift, more difficult problems are encountered for, in addition to the varying stages of water, such streams are subject to changes in channel, the formation of bars of mud or sand and suspended matter carried by the water, especially during flood periods. Where there are wide variations between high and low water, the pumps are sometimes placed in waterproof pits within easy suction lift of the water at the lowest stage. In other cases, facilities are provided for raising and lowering the pumps with the varying stages of the stream. A permanent pump pit is to be preferred for, where the pumps are moved up and down with the stages of the river, the pumping station is little more than a temporary station, and the costs of operation and maintenance are excessive, because of the labor involved in moving the pumps and the expense for maintaining flexible connections for each change in pump location.

Where water is secured from streams having considerable variation in water levels, it is more difficult to maintain intakes in good operating condition than where the stage of water is uniform. In such locations, it is often necessary to extend the suction line or intake pipe a considerable distance into the stream to obtain a supply at low water. Thus the intake is sometimes inaccessible for long periods and it is doubly important that it and the screens be maintained in good condition at all times. In some cases, a second intake, located well above low water, is provided for use during periods when the lower intake is out of service. This is rarely necessary, however, if the intake is well designed and maintained.

Streams subject to wide variations in water level usually carry a great deal of driftwood; therefore, it is necessary to protect intakes from the formation of drifts that may cause damage; also, in navigable streams, intakes may be damaged by boats. Pile fenders may be required in such locations as protection from both boats and drift. Navigable streams are under Federal jurisdiction and it is usually necessary to secure approval of U. S. Engineers for extensive changes in suction lines or intakes where such conditions exist.

Changes in the channel of a stream or the formation of mud or sand bars are extremely troublesome. They occur in streams with beds or banks subject to wash, and frequently at bends in the stream or where two streams converge. To reduce the possibility of interference of this kind, it is advisable to select a location for the suction line or intake where such formations are least likely to occur. Properly-placed wing dikes extending into the stream are helpful in preventing the formation of bars at the intake, as the dikes will divert the current and prevent deposits at undesirable locations. Several dikes or baffles may be required to maintain a fixed channel and open water at the intake. Where such protection involves considerable expense, it may be more economical to extend the intake line or relocate the intake.

Lakes

Small lakes or ponds present few problems in the operation and maintenance of pumping stations if the supply is adequate. The water level is generally constant, little trouble is experienced from debris or matter in suspension, and they are free from difficulties from high winds and currents that are common to the larger lakes; therefore, the intake protection is negligible in most cases, and consists merely of a suction line extending into the lake. While the quality of the water from the large lakes

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Water Service Facilities—

Supply—Streams, Lakes, Springs and Reservoirs

is uniformly good, storms and currents sometimes cause a great deal of trouble because of interference with intakes and pollution from sewage. Few railway water station intakes are located any great distance from shore, and as a result they feel the full effect of storms, and the water is often subjected to pollution from sewage and trade wastes. Such storms sometimes create deposits along the shore line and in others cause excessive damage to intakes that are without adequate protection from washing and scouring.

Off-shore winds erode the lake bed in shallow water and cause trouble with intakes. It is advisable therefore, to extend the intake out to deep water where it will be least affected by wave wash. Off-shore winds also often cause trouble from broken and slush ice, which will pile up in windrows along the shore, and completely shut off the water from intakes located close to the shore. A common difficulty with lake waters and sometimes with northern rivers during the winter is the formation of anchor and frazil ice. Another trouble experienced with lake intakes arises with small fish, which at times move in schools and may completely close an intake, or seriously interfere with the operation of the pumps if precautions are not taken to screen them out.

A multiple strainer in the suction line, usually near the pumps, is effective in removing fish or other debris before it enters the pumps. As the name implies, such strainers consist of two or more compartments, any one of which may be taken out of service and cleaned without stopping the pumps.

Springs

Springs give little trouble when the supply is ample. The water is usually free from sediment, although it may carry some fine sand. To overcome this condition, the usual practice is to maintain a small pool or reservoir for the collection of the water, which permits the sand to settle out before entering the suction line. Much of this sand can be disposed of if the channels leading to the reservoir are kept clean. If the flow is not sufficient to permit continuous pumping, the reservoir should have sufficient capacity to provide a reserve supply during periods when the pumps are not in operation.

The flow of a spring can sometimes be increased by opening up the water passages in the hill. This decreases the ground resistance to the flow and makes it possible to draw from a larger area. It also prevents loss from seepage.

Precautions should be taken to prevent the pollution of springs by live stock or from other sources. This can best be done by fencing around the spring. The growth of vegetable organisms in springs and collecting pools sometimes proves troublesome. This can be prevented by covering the reservoir to exclude light, as such organisms will not grow in a covered reservoir.

Springs occur in hilly country, as a rule, and in some cases they may be converted into gravity supplies by proper development and by taking advantage of their elevation.

Reservoirs

The term reservoir as used here applies to an impounded water supply, partly or wholly in excavation or retained by embankments or earth or masonry dams, as distinguished from steel or concrete tanks used for the storage of water.

Many railroad and other reservoirs are allowed to deteriorate through neglect, probably because they are considered permanent facilities that require little or no maintenance. Too often the result of this neglect is a large reduction in the capacity or the pollution of the water that may extend to the point where a total failure of the supply is threatened. Constant care and adequate maintenance are necessary to insure the maintenance of a sufficient supply and to protect the quality of the water. Silting, wave wash, leakage and the pollution of the water by wastes and decaying vegetation, are among the more common hazards to a reservoir water supply.

No. 2 of a Series

This, the second of the series of articles on maintaining railway water service facilities, discusses the problems most commonly encountered in the use of water from reservoirs and natural sources of supply, including lakes, ponds, streams and springs. The next article of the series will discuss wells

Streams Which Have a Wide Variation in Water Level Present a Number of Problems

The principal cause of silting is the washing of soil into the reservoir, although these deposits may be caused in part by organic growth in the water. Reservoirs located on very muddy streams have shown as much as 50 per cent loss in capacity in 10 years, while a loss of 1 to 1½ per cent per year is not unusual.

The condition of the watershed, particularly that portion immediately around the water's edge, has an important influence on the rate of silt formation. The marginal land around a reservoir should be kept well sodded or, better yet, should also be forested. No cultivation of marginal lands should be allowed within 500 ft. of the water's edge. Grazing should not be permitted on watershed where it can be prevented because of the possibility of manure affecting the quality of the water.

Forestation greatly influences the rate of evaporation; trees will absorb more heat than soil or rocks. The leaves of trees also tend to keep the air cool by transpiration while the roots of trees protect against erosion. The only objection that can be made to the forestation of a watershed is the washing of fallen leaves into the reservoir; this is offset, however, by the fact that the decaying leaves form a carpet which prevents washing.

Every precaution should be taken to prevent scours or gullies forming in the watershed for, once started, they are difficult to control; they are among the principal causes of decreased capacity through soil deposits. A well-sodded and forested watershed is the best protection of a reservoir from silting. Where reservoirs are supplied in whole or in part by small streams, a series of small dams may be constructed in these streams to intercept the heavier silt during flood periods. This silt can then be removed readily by a dragline during dry weather.

There is no economical way to remove silt from a reservoir. In most cases where the storage capacity has been reduced materially, the cost of the removal of the silt will exceed the cost of a new reservoir. This cost will vary with the location, local conditions and methods followed; it will range between 10 and 30 cents per cubic yard of material removed. On the basis of 20 cents per yard, the cost of the increased storage capacity obtained by cleaning approximates $100 per million gallons. Such a figure is prohibitive in many cases, although there are conditions where there is no alternative other than to restore the storage capacity of a reservoir, regardless of cost.

In general, there are only two methods by which reservoirs can be cleared of silt without draining them entirely, namely, through the use of draglines and of suction dredges. If conditions are favorable, the dragline is desirable, and in most cases most economical. It can be employed in the form of (1) a dragline outfit mounted on a crawler tractor, or (2) a cable-operated type of dragline.

The crawler type of dragline is suitable for use only in the smaller reservoirs because of its relatively short boom; its radius of operation is limited to a comparatively narrow strip around the shore line of the reservoir, and then only where there is a reasonably gentle slope to the water's edge. This method has proved fairly successful in some instances when the work is done at a time when the water is at a low stage.

The disposal of the material excavated adds to the problem. If the amount is limited, it may be deposited along the shore above the high water line, but larger quantities must be hauled away in dump wagons for disposal, which adds to the expense.

The cable type of dragline consists of a bucket carried by a cable suspended across the reservoir and operated by a hoisting engine located on the shore, the hoisting engine and cable anchors being moved along the shore of the reservoir as required. Hoists mounted on crawler tractors are especially adapted to work of this kind. This is probably the most effective and least expensive method where a large amount of material is to be handled.

Suction dredges are adapted to the removal of silt from reservoirs, but they require a great deal of equipment that is not readily available on a railroad, with the result that such work is usually handled by a contractor who has the necessary equipment. One disadvantage in the use of a suction dredge for cleaning reservoirs is the amount of water required. Assuming that the percentage of solids handled in dredging is 20 per cent, each yard of material requires 1000 gal. of water, and a few reservoirs have sufficient reserve capacity to permit such a loss of water.

Although sluice gates or waste pipes are usually provided in reservoir dams, they are of little benefit in removing silt, except for a limited area in the immediate vicinity of the opening, and unless they are well maintained and are operated at frequent intervals they soon become inoperative and worthless.

Dams

The maintenance of well-designed and well-constructed dams and spillways requires little effort, as a rule, but they should be subjected to careful inspection at frequent intervals. Earth dams should be kept well sodded to avoid scour or wash. The top or crown of the embankment should be maintained at its full height. The face or water side of the dam should be protected from wave wash with rip rap or concrete paving, which should be maintained in good condition and replaced or repaired if displaced or damaged by frost or wash.

The safety of an earth dam is sometimes threatened by burrowing rodents, snakes and crayfish. Many dams are protected against damage from this source by the construction of core walls that are designed to render the dams impervious to burrowing animals or other forms of animal life. Many other expedients are employed with varying success to prevent damage by these pests. Facing the slope with gravel is effective, but it is expensive to place and maintain, particularly on relatively steep slopes. Furnace slag gives better protection and can be maintained at less cost. Other methods are trapping and poison; the principal objection to the latter is the danger of killing live stock. Creosote poured into the holes or sprayed along the faces of the slopes will tend to discourage such activities.

The spillway should be kept clear of obstructions that might interfere with the discharge of overflow water. Fish screens should never be placed directly across the spillway opening, as it may become obstructed by leaves and other floating debris to such an extent that it will cause the water to rise to a dangerous height on the dam.

Leakage

Any leakage in either an earthen or masonry dam should be given immediate attention. Leaks in masonry dams or spillways can usually be repaired readily by filling visible cracks or openings with cement grout, or by plastering the upstream face with rich cement mortar; cracks or fissures otherwise inaccessible can be repaired by filling them with Bentonite clay or similar material. The clay or other material will pass in with the water and, because of its propensity to swell when wet, will usually stop the leak.

Leaks through earth dams present a more serious problem. If the seepage water through an earth dam is clear it indicates that no earth is being washed away, and there is no immediate danger. If, however, the water is muddy, it means that the dam is being weakened, and every effort should be made to stop the leak at once, even if it is necessary to lower the level of the water in the reservoir until repairs

can be made. Leaks can sometimes be stopped by excavating below the leak at the up-stream face of the dam and filling with good material, well rammed in place. In some instances it may be necessary to cut down from the top and fill in with good material, well bonded to the old fill and compacted in the same manner as in a new dam. Bentonite clay is also effective in stopping leaks in earth fills, if the source of the leak can be found. This source can sometimes be found by using salt and titrating the water with potassium chromate and silver nitrate solutions, or through the use of coloring matter, such as the dye fluorscein which has powerful coloring properties. This chemical will show color when present in as minute quantities as one part per million. These materials can be secured in many drug stores.

Vegetation

Vegetation in the form of aquatic plants, such as water lilies, water hyacinths and bullrushes sometimes creates a serious problem, particularly where a large area of the reservoir is shallow or where it borders on a swamp. Other forms of marine growth, known as algae, grow in deeper water. All forms of vegetation are objectionable in reservoirs when present to any considerable extent, this being especially true if the water is used for human consumption. They present an unsightly appearance, impart undesirable tastes and odors to the water, increase silting, clog intakes and screens and, where large quantities of decaying vegetation accumulate, they may introduce enough organic matter into the water to impair its value for use in boilers. To be on the safe side, it is advisable to keep vegetation under control at all times; weeds growing in shallow water can be removed by dragging chains or wire rope along the bottom. One railroad advises the use of a long band saw operated from boats to cut the growth a few feet below the surface of the water.

The best time to remove weeds growing along the shore line is when the water is low and they are more readily accessible; if the ground can be allowed to dry out, they can be cut by grub hoes and mowers. One railroad has found that creosote sprayed along the shore line during low water will discourage weed growth; the oil, being heavier than water, does not float to the surface and does not affect fish life or the quality of the water, if used judiciously.

The removal of algae is comparatively simple; copper sulphate (blue vitrol) has been found effective in killing them, and is used extensively for this purpose. A very light dosage will kill most of the undesirable forms of algae; one part of copper sulphate in 5,000,000 to 10,000,000 parts of water is effective in nearly all cases. This salt is highly toxic to fish life, however, and caution should be observed in its use where a reservoir has been stocked with desirable fish. Concentrations as high as one part in 3,000,000 will not kill suckers, yellow perch, carp and sunfish, while the concentration should not exceed one part in 7,000,000 if it is desired to avoid affecting trout. Where fish are not a factor in limiting the concentration, one part of the salt in 2,000,000 parts of water will kill all forms of algae. These small quantities of the poison, when distributed uniformly throughout the water, will have no appreciable effect upon the water for either drinking purposes or boiler use.

The simplest and most effective method of application to railroad reservoirs is to place the dry copper sulphate in cloth or burlap bags and drag them through the water along predetermined lanes by a boat. This prevents high concentrations in any one area and hastens the diffusion throughout the entire body of water. Best results are obtained if the chemical is applied when a wind is blowing as this helps to secure a uniform mixture of water and chemical.

A good growth of grass on the slopes of earth dams as well as on the steeper slopes of the watershed is necessary to prevent erosion. This protection is usually provided when new reservoirs are constructed, and should be maintained to prevent sloughing and gullying of the slope. It is not always easy to maintain such a growth under some conditions, especially if the wrong kind of grasses are planted. Wherever possible, native grasses should be employed as they are inured to the climate and soil and usually produce better results than imported grasses. It is also better to use a mixture, except where Bermuda or similar grasses are used; about 50 lb. of grass seed will be required per acre. The best method of starting a growth on steep slopes is to transplant root stocks not more than 18 in. apart. Where the soil is poor it may be necessary to use fertilizer to secure good results.

Fish and Pollution

As a rule, the presence of fish in reservoirs is not objectionable unless they are allowed to multiply to the extent that they interfere with pumping. Screens will prevent the larger fish from entering the suction lines, but the small fry sometimes give trouble when present in large numbers; schools of small fish have been known to clog pumps completely. It is always desirable to maintain screens of fine mesh and large area. The area of the screens should be several times the area of the suction line, as this will reduce the velocity of the water through the screen openings and lessen the possibility of the small fish being drawn to or through the screen.

Only the most desirable species of game fish should be used in stocking a reservoir. Undesirable species, such as carp and dogfish, are only a nuisance, and are difficult to get rid of, except by methods that also destroy the desirable species. Methods followed in removing or reducing the number of fish in a reservoir are the use of explosives or poison, seining and opening the reservoir to anglers. Copper sulphate in the proportion of one part to 2,000,000 parts of water will destroy all fish life without affecting the water for general use. Seining will remove the undesirable fish, while the desirable species can be retained. The reservoir should be opened to anglers only under strict supervision, as such privileges are often abused and are difficult to control or abolish. It will be found in many cases that unauthorized fishermen will prevent fish from multiplying to the extent that they prove troublesome.

The most effective method of preventing pollution of a reservoir water supply is to secure control of the

A Typical Reservoir, Showing Part of the Dam, Spillway and Baffles to Retard Current

entire watershed or catchment area. This is seldom possible except with relatively small reservoirs having limited watersheds. Strict control through adequate policing should always be exercised over that portion of the catchment area that is owned or controlled by the railroad.

All reservoirs are subject to some pollution, and constant vigilance is necessary to keep it to the minimum. Reservoir sites are selected with a view to avoiding such contingencies, but in many cases sources of pollution come into existence after the reservoirs have been completed and sometimes after they have been in use for years. Sewage and trade wastes are the most serious sources of pollution of a locomotive water supply. Most states have laws controlling the pollution of existing water supplies, but they apply chiefly to municipal supplies and are cumbersome and slow in application.

Development of a new oil field invariably results in the pollution of surface water supplies by the salt water pumped from the wells. The reservoir of one middle western city became so badly polluted by salt water from oil wells that it became necessary to abandon it and construct a new reservoir at an expense of three-quarters of a million dollars. Another city in the south was forced to spend more than a million dollars in the development of a water supply to replace one that had been ruined by salt water from a new oil field, while the railroads using the water suffered untold damage to locomotives.

Coal-mine wastes and water pumped from the mines, which is always high in free sulphuric acid, are among the worst, if not the worst, sources of pollution of industrial water supplies. An eastern railroad suffered losses running into the millions of dollars because of the pollution of reservoirs by mine wastes. Fortunately these extreme cases are comparatively rare, but in numerous instances, pollution from trade and other wastes is causing excessive damage to locomotives. No source of pollution should be overlooked, even though it may appear insignificant. Wherever possible, state or local laws should be invoked to curb such pollution.

Under no circumstances should any industry or other establishment that might affect a water supply adversely, be allowed to locate upon the watershed of any reservoir if it can be prevented. This applies also to the recreational use of both reservoir and watershed. The use of the reservoir for boating or fishing, and the establishment of summer camps on the watershed are sometimes permitted. On the whole, such practices are objectionable, but when they are allowed, they should be governed by rigid sanitary rules, strictly enforced.

If cabins, cottages or other buildings are constructed, they should be provided with approved septic tanks for the disposal of excrement when required. Garbage should be placed in containers and either burned or removed from the watershed. The construction of any permanent or semi-permanent structure should be covered by a lease or other agreement containing the prescribed regulations. If the water from the reservoir is used for human consumption, either with or without filtration and chlorination, swimming should be prohibited. If swimming is permitted, it should be confined to prescribed limits remote from the intake or suction line of the pumps.

While policing of the reservoir property is important, the employment of special policemen or guards can rarely be justified because of the expense. Pumpers, section foremen, trackwalkers and water service repairmen should be required to give the property such attention as their other duties will permit. One railroad has met with considerable success by giving jurisdiction over recreational rights to local chapters of the Izaak Walton League and Rod and Gun clubs. While placards are of doubtful value, the property should be posted against trespassers and written permits required for access to the property by any one other than specified employees of the railroad.

Bridge Shop Proves Worth on Erie

(Continued from page 437)

as well as plugs for filling unused rivet holes in re-used second-hand material.

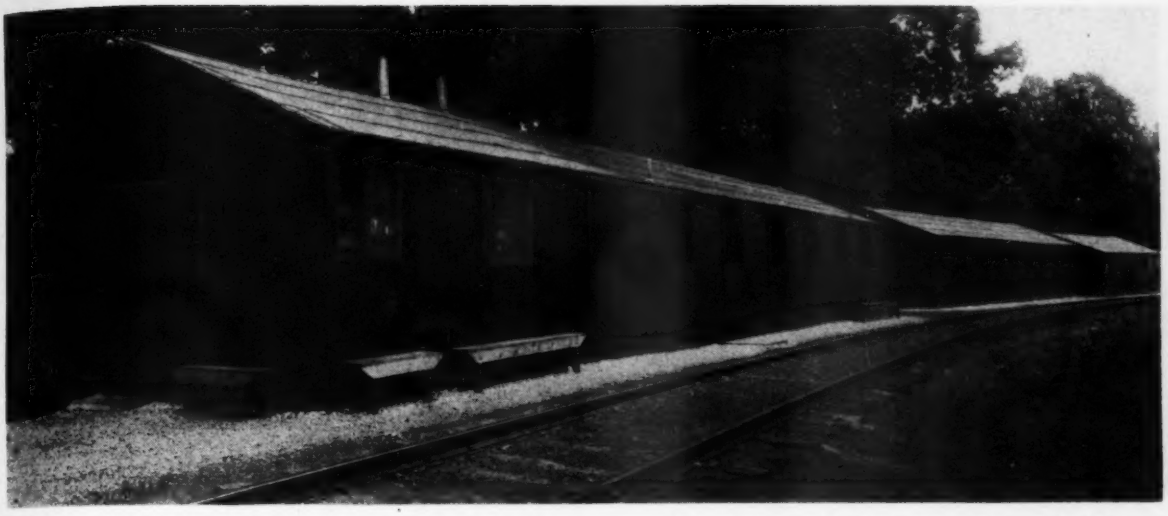
All the material fabricated at the shop is installed in the field by this company's system bridge gangs, of which there are seven, exclusive of the one that operates the bridge shop, and all of which are included in the organization of the department of structures. These are thoroughly-equipped, highly-mechanized floating gangs housed in camp-car outfits. Five of them are equipped and organized to perform all types of repair or erection work on steel bridges. Another of the gangs is under a painter foreman, and, although this gang performs miscellaneous repair work in connection with the lesser bridge jobs, it specializes in the painting and waterproofing of bridges. The seventh gang, smaller than the others, is under the supervision of an assistant welding foreman and handles the lighter repair jobs, especially where welding predominates.

These gangs are moved over the system from point to point in local or through trains, the movements usually being made during week-ends to avoid the loss of productive time that would be occasioned if the gangs were moved during week days. Each floating bridge gang is furnished with a rail motor car and trailer, and a full complement of power tools and equipment. In addition, portable electric welding outfits are available for assignment to the gangs when needed. Also, a 1½-ton automobile truck is available for use by these gangs, being assigned where needed by the headquarters office.

An example of the type of work that is done at the shop is afforded by a project that is now under way. This undertaking will involve the reconditioning of several wrought iron towers of a viaduct 818 ft. long and 200 ft. high over the Genesee River gorge at Portage, N.Y., which was built in 1875. A total of 260 tons of steel will be fabricated at the shop for use on this project. Following its fabrication (by riveting and welding) and painting at the shop, this material is being erected by one of the company's system bridge gangs.

The shop facilities at Port Jervis, and the bridge fabrication, repair and erection organization, and the use of second-hand material described in this article, are considered a great asset to the railroad, especially in furthering the all-out war effort it is making. At a time when critical materials are extremely scarce and commercial shops are so flooded with high-priority work, the railroad is able to keep its bridges in good condition, thereby permitting traffic to move over them safely at high speed, and thus expediting the handling of war materials and service men.

The Erie system bridge shop and system bridge gangs are now under the general supervision of A. M. Knowles, engineer of structures, who reports to J. W. Smith, chief engineer. The shop was developed largely under the direction of Frank A. Howard, who was Mr. Knowles' predecessor until his retirement early in 1943, and who was associated with him in the department of structures for 38



The Camps of Prefabricated Construction Are Each Designed to Accommodate 60 Men and Include a Recreation and Washroom Building, a Dormitory, and a Mess Hall and Kitchen

Demountable Buildings Help Solve Labor-Housing Problem

Facilities on B. & O., provided to cope with manpower shortage, include 16 camp-car outfits, 10 camps in existing permanent structures, and 8 of prefabricated construction

TO relieve the labor shortage on its lines, the Baltimore & Ohio has resorted to a number of expedients that have enabled it to achieve a measure of success in solving the problem. As on many other roads, the most productive measure adopted has been the provision of labor camps on an extensive scale. This road has organized 34 camps with a capacity for housing about 2,000 men. Other expedients that have contributed toward the solution of the problem include the employment of women in considerable numbers for certain types of work, and of boys of high school age in states where this is permissible.

Three Types of Housing

With reference to labor camps, the B. & O. is making use of three general types of facilities, namely, camp-car outfits, stationary labor camps of permanent construction, and labor camps constructed of prefabricated, demountable buildings. The company has found that each of these types of facilities has advantages when used under certain conditions and that, when employed in the proper combination with each other, they constitute an important factor in helping to solve the labor problem. Practically all of the housing facilities in the three categories on the B. & O. have been brought into use since the present emergency arose, and are modern and up-to-date in every respect. Special emphasis is placed on the need for providing recreational facilities and practically every labor camp has a room set aside for this purpose.

Of the three types of housing facilities in use on this road, the camp-car outfits are most numerous. There are 16 outfits of this type, each comprising 10 cars with a capacity for accommodating 60 men. Each of these outfits includes a commissary car, a kitchen car, a dining car, six sleeping cars, and one recreation car. The cars in these outfits consist of remodeled boxcars, and, as already indicated, they were all placed in service within recent years, replacing older equipment that had become obsolete or worn out. The railroad feels that the new and more modern equipment has been an important factor in helping to keep the camp-car outfits up to a reasonable percentage of their capacity. It has been found, incidentally, that when difficulty is encountered in keeping men at a particular camp, the situation can sometimes be improved considerably by moving the camp to a different location.

Stationary Labor Camps

To supplement the camp-car outfits in territories where the shortage of labor is particularly critical, the railroad has established a considerable number of stationary labor camps, a type of facility that had not been employed on the B. & O. since the first World War. In this classification are included the other two types of facilities, namely, the labor camps of permanent construction and those consisting of prefabricated buildings. The former category consists largely of camps installed in existing privately-owned buildings that have been taken over by the

The Dormitories of the Demountable Camps Have 30 Double-Deck Steel Bunks

road under lease agreements and remodeled as necessary. There are 10 camps of this type, with capacities ranging from 40 to 100 men each. It has been found that almost any type of building of the proper size and of sound construction can be used for this purpose, including old houses and hotels and even, in one case, an abandoned night club.

Demountable Buildings

The labor camps constructed of prefabricated, demountable buildings comprise a type of facility that is being used for the first time on the B. & O. Buildings of this type have been chosen for use at certain locations to meet the need for housing facilities having the advantages of permanent construction, but which, if the need should arise, can be readily dismantled, transported and re-assembled at a new location. It is recognized that conditions today, especially those affecting the labor supply, are subject to rapid changes and that it is always possible that labor shortages may be alleviated in some areas while persisting or even becoming more critical in others; hence, the desire to provide housing facilities that can be readily transferred from one location to another if this should become desirable.

Labor camps consisting of demountable buildings have been established at eight different locations. Like the camp-car outfits, each of these is designed to accommodate 60 men. The buildings used are of the type manufactured by Bush Prefabricated Structures, Inc., New York*. Briefly, the construction embodies standardized wall, floor and roof panels which may be bolted together to form one-story buildings 20 ft. wide and of any length in multiples of 8 ft. The panels, of which six standard types are used for each building, are of wood construction. For the foundations, three rows of supports capped by timber sills are needed, one along the center of the building and one along each side.

* The structural features of buildings of this type were described in an article appearing in the November, 1943, issue of *Railway Engineering and Maintenance.*

The Mess Hall at One of the Prefabricated Camps

Details of Camps

On the B. & O. each of the labor camps of this type consists of three buildings, comprising a dormitory 72 ft. long, a recreation and washroom building 48 ft. long, and a mess hall and kitchen 72 ft. long. The dormitories are each provided with 30 double-deck steel bunks and are heated by two coal stoves. In the building containing the recreation room and the washroom, the latter facility occupies a 16-ft. length of the structure and has a concrete floor. The fittings and toilet facilities in this room are of the most modern type and include a Bradley wash fountain, with a foot treadle for operating the valve, and shower baths. Other equipment in the room includes a hot water tank with a coal-fired stove for heating the water. The recreation room, which occupies the remainder of this building, is furnished with tables and chairs, is heated by a coal stove, and has a drinking fountain. In the third building, the dining-room occupies a 48-ft. length of the structure, and is separated from the kitchen by a partial partition. On the opposite side of the kitchen is a smaller room which is used as a storeroom and commissary.

The buildings comprising these camps are erected by the road's division carpenter forces. Ordinarily, it is the practice to locate them in a secluded place, although the availability of the necessary space is often the determining factor in this regard. The arrangement of the buildings relative to each other is likewise usually determined by local conditions; at some locations, they are placed in a row, end to end; at others, they are parellel to each other.

In summary, it may be said that in its efforts to overcome the labor problem, the B. & O. has called into use these different types of housing facilities in a balanced, integrated program, including installations of the newest developments in this field, namely, prefabricated, demountable buildings which, because of their characteristics, are found to be highly adaptable for this purpose.

New Burning Method Speeds Weed Destruction

In view of the restrictions that have been imposed on the consumption of petroleum and petroleum products, not a few roads have found it difficult to obtain enough fuel oil to carry out their weed-burning programs. This article describes a method of burning weeds that reduces the oil consumption, increases materially the mileage that can be covered in a given time and at the same time gives equally satisfactory over-all results as former methods

MAINTENANCE officers differ somewhat in their views as to how the burning of weeds should be conducted, particularly with respect to the speed at which the burner should be operated. In some instances, the roadmaster or supervisor specifies the speed; in others, this is left to the operator of the weed burner, who is merely instructed to "do a good job."

In an article entitled Methods of Noxious Weed Control, published by the Bureau of Reclamation, United States Department of Commerce, C. L. Corkins, entomologist of the state of Wyoming, suggested that the operating speed of weed burners can be increased and still obtain the same over-all results, with a substantial reduction in the amount of fuel oil used.

In this article Mr. Corkins said in part:

"The most important factor in the burning process is to sear the plants lightly, rather than to scorch them heavily or to consume them completely. The flame should be passed rapidly over the upper surfaces of the foliage so that it is seared so lightly that the plant will not wilt down entirely until the following day. Light or slow burning acts like a clean cut at the surface of the ground, in that the plant will spring into life almost immediately.

"On the other hand, light searing kills the plant several inches down and into the root system. The first burning is given at the pre-budding stage in the spring, when the starch reserves are lowest and the roots are in the poorest condition to withstand shock. The types of weeds encountered in our tests near Powell, Wyo., consisted of white top, clover, Russian knapweed, thistle and numerous others common to the Northwest."

The speed of burning raised in this paper was discussed among operating and maintenance officers of the Northern Pacific, and it was decided to conduct weed-burning tests on the Oakes branch, near Jamestown, N.D., to determine the killing effects of burning at operating speeds of 4, 6, 8 and 10 miles an hour.

For the purpose of this test, a section of track was selected upon which the vegetation was of uniform growth. Markers carrying the figures 4, 6, 8 and 10, to indicate the speeds at which the burner was to be operated, were placed at intervals of 350 ft. Color photographs were taken of this track before the burning operation was started. The weed burner was then operated at 4 m.p.h. over the first 350-ft. section; at 6 m.p.h. over the second; and at 8 and 10 miles per hour respectively, over the remaining two test sections.

Three days later, a second set of color photographs was taken, so that a study could be made of the effects produced at the different burning speeds. Then 30 days after the burning, color photographs were taken again to permit further study of the results.

Close study of the track and of the color photographs, and an investigation of the root system of the plants in each of the sections, indicated clearly that an operating speed of seven to eight miles an hour gave the most satisfactory results. In fact, the weed destruction was as complete as at four to six miles an hour. Incidentally, during August, when this test was conducted, the precipitation for the month was 3 in. The test was carried out by the maintenance forces of the Fargo division, using a Fairmont M 27 series G weed burner equipped with six burners.

Top Below—Test Track Before the Weed Burner Was Operated Over It. Note Uniform Growth of the Vegetation. Bottom—The Same Track Three Days Later. Note How Plants Are Wilted Rather Than Consumed

Failure to Flag Causes Three Deaths

ON February 10, a head-end collision between a freight train and a track motor car resulted in the death of three employees and the injury of three others, on the Western Pacific near Pulga, Cal. The accident occurred on single track, at about 11:50 a.m. during clear weather. The employees involved in the accident were members of a bridge gang.

In the vicinity of the accident the alinement consisted of a succession of curves, joined by short tangents, ranging from 3 deg. to 6 deg. 8 min. The accident occurred on a 5-deg. 3-min. curve at a point where the view was limited to about 200 ft. At this point also there was a 0.92-per cent grade descending to the west.

In its report, from which this information is abstracted, the Interstate Commerce Commission stated that the bridge force was engaged temporarily in repair work about three miles east of Pulga, and made frequent trips by motor car between the site of the work and Pulga. A portable telephone had been provided for communication with the train dispatcher. At 11:35 a.m., preceding the accident, the foreman called the dispatcher to obtain information concerning train movements between Pulga and the site of the work. The dispatcher replied that there would be no train out of Pulga until 1:30 p.m.

On the basis of this information, the foreman permitted the motor car and trailer to run to Pulga without flag protection, although he was aware that the rules required that a flagman precede the motor car at all points where the view was obstructed. In fact, on previous trips he had always required this form of protection. In this instance, however, he relied to a considerable extent on the fact that recently practically all train movements in this vicinity had been discontinued, because of a fire in a tunnel about 18 miles east of Pulga.

The motor car, with trailer attached, left the site of the work at 11:45 a.m. and proceeded west toward Pulga. Extra 22, an eastbound freight train, departed from Pulga at 11:45 a.m. and while moving at an estimated speed of 15 miles an hour, collided with the motor car and trailer, which were moving at an estimated speed of 10 miles an hour. The motor car was demolished and the trailer was damaged slightly.

In its discussion of the accident, the Commission said that operators of motor cars on this road were authorized to obtain information regarding the movement of trains, but they were instructed that such information did not permit the operation of motor cars without adequate flag protection. The purpose of issuing this information was to prevent trains from being stopped by a flagman for a motor car.

After the accident, the dispatcher said that he thought that it was the section foreman at Bloomer, 21.6 miles west of Pulga, who was asking for information regarding train movements between Pulga and Bloomer. At that time, Extra 22 had passed Bloomer enroute to Camp Rodgers, 16 miles east of Pulga, from which it was to return to Oroville, 34 miles west of Pulga. He expected this train to leave Pulga on its return (westbound) trip about 1:30 p.m., and the information he gave was in reference to this westbound trip.

In concluding its discussion, the Commission stated that if the movement of the motor car and trailer had been made under flag protection, in accordance with the rules, this accident would not have happened.

Packed Flangeways Derail Passenger Train

A PASSENGER train on the Minneapolis, St. Paul & Sault Ste. Marie was derailed at Venlo, N.D., on November 4, 1943, resulting in the death of two persons, and the injury of three others. The line upon which the accident occurred is single track and the track, which was on tangent, was laid with 85-lb. rail 33 ft. long, on 19 ties to the rail length. It was fully tie plated, with five anti-creepers to the rail length, and was ballasted with nine inches of gravel. The authorized maximum speed for passenger trains was 60 mph.

The accident occurred at a highway grade crossing 543 ft. east of the station at Venlo. The highway, a dirt road, crossed the railway at an angle of about 42 deg., at a point where the track was on a 6½ ft. fill, over a plank crossing 24 ft. wide. The planks were approximately level with the top of the rail, and the flangeways were 2¼ in. wide. Twenty-seven feet west of the crossing, there was a No. 10 turnout with facing points for westbound trains, leading to a passing siding on the south side of the main track.

Westbound train No. 105, a first class passenger train, consisting of a locomotive, one mail-express car and one coach, both of steel construction, was running at a speed of 50 to 55 miles an hour when it was derailed. The locomotive stopped on its right side 373 ft. west of the crossing and was badly damaged, both members of the crew being killed. The tank was torn from its frame and both cars were damaged.

Examination of the track disclosed a flange mark on the top of the south rail, starting 12 ft. west of the east end of the crossing, which continued to a point immediately east of the turnout switch. Opposite this mark there was also a flange mark on the edge of the plank adjacent to the north flangeway. Wheels had dropped to the ties 49 ft. west of the switch points and the track was torn up for 183 ft. west of the frog.

Investigation disclosed that shortly before the accident, county highway employees were operating a grading machine immediately south of the crossing and that this machine was turned on the crossing. In doing so, a considerable volume of soil was dropped by the machine and filled the flangeways. About 1 hr. 40 min. before the derailment, an eastbound freight train passed over the crossing, the crew of which noticed the earth on the crossing. The section foreman stated that he had inspected the crossing about eight hours prior to the derailment and had found the flangeways clear. The Commission concluded that the freight train had packed the dirt in the flangeways solidly enough to cause the left front engine-truck wheel to be raised high enough to allow the flange to ride the rail and cause the derailment.

Many Types of Machines Available for Mowing Work

Abstract of a report presented before the annual meeting of the American Railway Engineering Association in Chicago on March 14, which describes the development of power mowing machines and points out that many different types are built that will do almost any kind of right-of-way mowing*

THE cutting and eradication of noxious and other weeds and grass on the right-of-way of American railways have always been important and expensive operations. For the duration of the war, scarcity of oils for the burning of weeds and chemicals for their destruction has added further difficulties.

In the past, some railways have been able to get the farmers to mow weeds, giving them as compensation the hay mown, or, in some other cases, the old cross ties removed from the track. Today few farmers have the labor or time to do any of this work.

Some railways have destroyed weeds with steam applied by means of suitable jets and piping. The equipment is usually put under the body of a car, with canvas baffles to produce the most effective results. This method has been fairly successful, if the speed of the steamer is not in excess of about two miles per hour.

Railways that have an adequate fleet of power mowers at this time are very fortunate, particularly so if they can get the labor to operate them.

Manufacturers of power mowers for the past 30 years have improved them to a point where many mowers are now offered that will do almost any mowing on the right-of-way. Railway officers responsible for their selection should become thoroughly familiar with the various types and models, and choose those best adapted to handle vegetation of the character encountered on their individual lines. There are several manufacturers of these machines and many different kinds which may be grouped or classified, in general, as on-track mowers, tractor mowers, motor sickles and motored lawn mowers and trimming cutters.

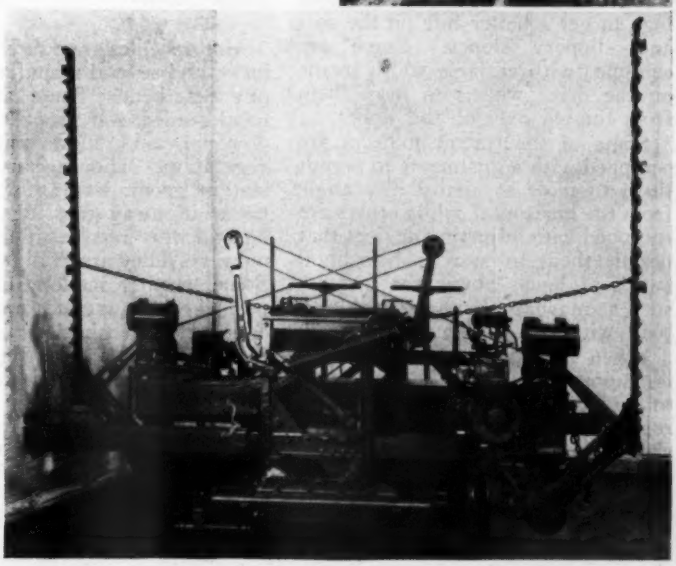
On-Track Mowers

There are many different kinds of on-track mowers; some are self powered and self propelled; others have individual motors for operating each sickle, and extension arms and pitmans, to mow one, two, or three five- to six-foot swaths out from the rail, and over almost any contour and angle. The number of mowing machines in service on the railways ranges all the way from 1 to 37 per company, and they are of the various types offered by the manufacturers. Some are built in the shops of the railways.

Most commercial on-track mowers are of the two-cutter-bar type, which mow a five- or six-foot swath on each side of a single track, the distance away from the rail depending on the length of the extension arm and pitman used. One manufacturer of track-bound mowers now offers a mower that will cut on either side of the single track or between the rails. One railway has built a mower in its shops that has two cutter bars on each side, with a fifth for mowing between or over the rails.

Most of the late model commercial on-track mowers have an engine to power each sickle, which permits mowing either side while the opposite cutter bar is raised to clear such obstructions as switch stands, etc. Most of them are towed by heavy-duty motor cars. This permits the use of lighter units that are easier to remove from the track when necessary. Also, the heavy-duty car may be used for other service when not being employed for mowing.

Where the traffic will allow, on-track mowers, operated by experienced men, will do a better job of mowing as far out from the rail as the extension arms will permit, than can be done by laborers with hand scythes. One railway has mown many miles at a cost of about one dollar per mile for single swaths on each side of the single track. On the other hand, on-track mowers can be used only during the mowing season, although the engines powering the sickle bars and the motor car towing the mower may be used for other purposes during the off-mowing season. In addition, on-track mowers can be used to advantage only where train movements do not cause ex-



Right—A Tractor Mower. Below —On-Track Mower, Equipped to Cut a Wide Swath

*Presented by a subcommittee of the Committee on Maintenance of Way Work Equipment, of which C. H. Ordas, supervisor of motor cars, Chicago, Milwaukee, St. Paul & Pacific, was chairman.

cessive interference with their operation.

Usually, it is necessary for the section men to follow up the mower to trim up vegetation not mown, such as around switch stands, track signs, semaphore posts, rail rests, etc., unless such obstructions are moved out beyond the swath before the mowing is done.

Tractor-Type Mowers

Tractor mowers can mow anywhere without train interference, and can move over the highway to the point where they are wanted. Most of these are of the ordinary tractor type with mowing attachments. These are generally operated by an experienced tractor operator, who is sometimes given an assistant, to do the trimming around obstructions that cannot be reached by the machine; also, to assist the operator in servicing the equipment, in making repairs, and to free the sickle of any vines or wires that may become lodged in the sickle or guards.

Tractors of the farm type are usually equipped with a power take-off, so that they can be equipped with mower attachments. However, some of the machines now offered have been built by manufacturers who have given consideration to the special conditions that are presented in mowing on the right-of-way and which differ appreciably from those encountered in ordinary farm and highway mowing. These special railway types are able to mow on slopes of 45 deg., if the footing is good for the rubber-tired driving wheels. They also will operate where the ground is quite rolling.

Some of them are equipped with water-loaded tires, to give better traction and to enable the diagonal lugs to get a better bite on the soft and slippery slopes. Some are equipped with variable width treads on the drive wheels to keep them from tipping over on the slopes.

Some of the tractor mowers are equipped with adjustments to permit them to mow at almost any angle from the horizontal, while others are equipped with adjusting devices that permit them to mow a horizontal swath at levels above the ground, such as mowing above the curb of a road with the wheels on the road.

When selecting such a mower, it is important to give consideration to the location of the cutter bar with respect to the driver's seat. The sickle should operate between the front and rear wheels, and not in front of, or behind the wheels. It is important that the operator see the obstructions before the sickle hits them. The ideal location of the cutter bar would be in line with the rear wheels, so the sickle would move up and down with the wheels on rolling ground. Tractor mowers have the advantages that they can be run by a single experienced operator, that they can mow anywhere on the right-of-way between the rail and fence without creating any interference with trains, and they can move on the highway from one location to another when equipped with suitable tires.

When the mowing season is over, they can be used for any tractor work within their capacity and, with proper attachments, for such work as sweeping or plowing snow off station platforms, etc. They have been used to shunt cars in shop yards and at industries.

Tractor mowers have the disadvantage that they are slower than on-track mowers and should seldom be used where on-track mowers can do the mowing, except to clean up at station grounds and at highway crossings, and between the track mower swath and the right-of-way fence. It has been found that tractors equipped with rubber tires will not do a good job of mowing while riding on the shoulder, as they have a tendency to slip off if the slope is steep. Better performance is assured if they are equipped with steel tires with lugs, but the shoulder will need dressing after the mower has passed, and tractors with steel tires and lugs cannot be run over paved highways. Some complain that the use of a tractor mower equipped with rubber tires on a railway right-of-way is very expensive, owing to the rapid destruction of the tires by barbed wire and other sharp objects.

Motor Sickles

Motor sickles are a recent development, and several manufacturers are offering them. These are usually hand guided, self propelled and self powered, and mow fairly heavy vegetation. They are used around station grounds and for trimming up at highway crossings at points beyond the reach of track-bound mowers. They are of different types. Some earlier models had to be pushed by the operator and had only one steel-tired wheel with a concave face to keep them from slipping sideways. More recent models have two rubber-tired wheels and are self-propelled, self-powered and hand-guided, with clutches to release the propulsion mechanism when necessary. Some of these have the sickle bar supported at both ends, others at the center only. If the cutter bar is supported at both ends, the operator must walk over the cut vegetation unless the bar is equipped with deflectors.

Motor sickles are usually powered with a light gasoline engine of about two horse-power. Each type has some desirable features. They are very economical to operate and maintain, and with an experienced operator, should do effective work on station grounds, at highway crossings, and even on the complete right-of-way between fences where the nature of the ground will permit. They are equipped with cutter bars 36 or 40 in. long, which permit them to mow between the rails, in yards or at sidings or other close quarters, if the ground surface is even enough for ready operation, or if they are suspended between the rails on dollies and pushed along the track.

In addition to the advantages already stated, motor sickles are low in cost, one-man operated, and if handled properly, will do more good mowing in both light and heavy vegetation than several men with hand sickles or scythes. Some of them can be equipped with wedge or angle snow plows to remove freshly fallen snow from station platforms; others also have accessories to adapt them for operating revolving brush sweepers. Because of their light weight and compactness, they can be transported easily from one station to another by baggage car. Because of their simplicity, they can be operated by almost anyone who knows how to run a track motor car.

Motored lawn mowers and trimming cutters are usually self-powered, self-propelled and hand-guided. They are usually used around station grounds where light grass needs frequent mowing and trimming.

Conclusion

Owing to the variable conditions on the various railways, as to density of traffic, density of vegetation, wage scales, etc., no data as to costs of mowing, maintenance of equipment, operation, or area or mileage covered per day are offered, but it is the consensus of the committee that the use of powered mowing equipment is advantageous. Costs of operation and the economies effected by the use of powered mowers are dependent on many factors, such as the purchase of the right machine for the work to be done; the competence of the operator; the density of the vegetation; the scale of wages paid; and the conditions under which the mower is operated. With careful operation, the expense for fuel, oil, grease and repair is negligible.

What's the ANSWER?

When to Bevel Rail Ends

Should the ends of rails be beveled at the time the rail is laid? Why? If not, how soon thereafter?

Should Follow Hardening

By C. B. Bronson

Inspecting Engineer, New York Central, New York

Before answering this question, attention might be called to the decided importance and great benefit that is derived from the cross slotting of rail ends. This should be a practice, chipped-out pieces, of various areas and depths, were common, because metal flowed from one rail to lap over the adjacent one, eventually pounding out and breaking off. Cross slotting has eliminated this condition or brought it almost to the vanishing point; that is, except where some one neglects to follow up the care that is being given the rail. It should not be overlooked that cross slotting can be done rapidly or that the cost is trivial compared with the advantages obtained.

When the beveling should be done depends on several factors. If the rail ends are hardened at the mill, the cross slotting can best be done as a part of the process of final dressing up of the track at the time the rail is laid. If the ends are hardened in the field, provided this is done within a reasonable time after the rail is laid, the slotting should be done at the same time. In other words, the slotting should follow currently the end hardening, whether the latter is done at the mill or in the field. This seems advisable for another reason, namely, the sharp edge at the rail end is more prone to chip off if the chamfering is not done immediately, because of the increased hardness resulting from the treatment and the possibility of some brittleness.

There is another field for slotting that should be discussed. This is where the rail ends have not been hardened. This phase is of particular interest to us, for we have done very little in the way of treating rail ends. Here a difference of opinion arises as to how soon the slotting should be done after the rail is laid. It is my observation that some time should elapse before the slotting is done. If it is done immediately after the rail is laid, flow will take place because the surface metal has not been cold rolled and consolidated, and the beveling will need to be done again at some later period. It seems best, therefore, to allow the running surface of the rail to become cold rolled first and permit the initial flow to take place, then follow with the slotting. The time element will depend on the judgment of alert supervisory forces, and will be governed more by the volume of traffic than by anything else. The amount of flow into the joint gap is greatly decreased after cold rolling has taken place, so that in a great many cases, probably a majority, a second touching up will not be necessary.

Better chamfering can be obtained when the joints are opened up or separated. If the rail is laid during warm weather, and the slotting can be delayed, a better and more satisfactory job can be done during the cooler weather of autumn when the rail has contracted. If, however, the rail is laid during cool weather when the joints are open, it may be expedient to do the beveling within a short time, rather than to delay it for several months.

The important thing is to get the

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

To Be Answered in July

1. *In view of the present shortage of labor, should maintenance methods be modified to provide for more extensive repair of work equipment in the field to obtain more hours of service from each machine during the working season? In what ways can this be done?*
2. *What limitations, if any, are there in spray painting the exteriors of buildings? The interiors? What precautions must be observed?*
3. *What precautions during and after installation will contribute to longer life of railway crossings? Of frogs? Why?*
4. *In what ways can bridge ties recovered during the replacement of trestles or the renewal of decks on steel spans, be used? What considerations govern?*
5. *What measures should be employed to insure the maintenance of correct elevation on curves? Does the character or density of traffic make any difference? The speed of trains? If so, what?*
6. *In view of the restrictions on pipe fittings, in what ways can they be conserved? Replaced? To what extent can screwed and flanged fittings be salvaged and re-used?*
7. *In view of the present density of traffic, is there any advantage in assigning a trainmaster to ballasting operations? If so, what? If not, why? To whom should he report?*
8. *If sufficient labor cannot be secured to complete building maintenance programs, should small building repairs be contracted locally? To what extent and for what work?*

chamfering done before any serious trouble develops, recognizing at the same time that a better job of beveling can be done when the joints are somewhat open. One important precaution is not to overdo the chamfering in either the mill or field, with respect to angle or depth. Otherwise, the considerable gap that is left on the running surface when the rail ends are tight, and the still wider gap when they are not, may defeat some of the purposes of cross slotting, or introduce the problem of increased batter.

All of these matters merely call for reasonable judgment on the part of the supervisory force, and years of experience in this line of work should have provided a background for doing this work correctly and effectively. The absence of chipping and a reasonably small amount of batter afford proof of the effective manner in which cross slotting is being handled.

After Two to Six Months

By J. B. KELLY
General Roadmaster, Minneapolis, St. Paul & Sault Ste. Marie, Stevens Point, Wis.

Observation during recent years leads to the belief that rail ends should be beveled in the track from two to six months after the rail is laid, the time depending largely on the volume of traffic. Since beveling is related closely to the hardening of the rail ends, and since it is beginning to appear that beveling the rail ends after they are hardened is not giving good results, the hardening or heat treatment should follow the beveling and both should be done in the track after the rail is laid. This also seems preferable, because in this way the rail is given the advantage of cold rolling by the wheel treads. This results in smoother rail ends over a longer interval before welding, replacement or reclamation becomes necessary, than where the beveling and heat treatment are applied before the rail is laid.

In some places, under ordinary traffic, the need for cross slotting the end-hardened rail does not become apparent for about a year after the rail has been laid. In such cases, to avoid chipping and damaging end batter on the rail, it becomes necessary to reslot the joints, and this is proving to be detrimental to the end-hardened rail. The Tenth Progress report of the special committee that is co-operating with the Rail committee of the American Railway Engineering Association, includes information on certain locations where damaging head cracks have occurred in the rail ends of heat-treated rail as a direct result of the beveling or re-beveling of the rail after the ends had been heat treated.

Dismantling Buildings

What methods should be followed when dismantling buildings to insure maximum recovery of materials? How can the recovered materials be used to advantage?

Must Be Done Carefully

By L. G. BYRD
Supervisor of Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

This is an important subject that should be given more careful consideration now than at any time in the past, primarily, at the moment, because many of the materials that can be recovered, particularly from frame buildings, are practically unobtainable in any other way. The methods to be followed in the recovery of these materials will vary somewhat because of differences in the design of the structures that are being dismantled. The buildings we have been dismantling for the last 14 years have generally been frame buildings, such as section dwellings and small stations on light-traffic lines. It has been our thought in removing these buildings that the cost of dismantling them to insure maximum recovery of the materials they contain, will increase little, if any, compared with methods that destroy much or all of otherwise usable materials.

In this connection, we must think also of the safety of our employees and patrons who may be required to pass by the buildings that are being dismantled. We follow the practice of removing dimension lumber, such as siding, boxing, sheathing, flooring, ceiling and the remainder of the frame structure by drawing the nails carefully before the timber is removed, or as soon as it is taken from its fastenings. We then place it in sorted piles where it can be checked easily, with notation as to where it can best be reapplied.

Usually, siding, drop siding, flooring and ceiling can be removed with little or no damage, or at least it can be kept suitable for reuse as subflooring and storm sheathing. When removing flooring, siding and ceiling, we use nail pullers, metal-cutting saws and 18-in. thin-bladed chisels. When such tools are employed for these purposes, there will be no damage to the materials.

If the structure is roofed with tile or asbestos shingles, they should be removed carefully, placed in suitable packages and lowered to the ground with hand lines through a sliding trough. At least 95 per cent of the shingles and 80 to 90 per cent of the remainder of the material in the material in the structure can be saved for future use.

Recently, we have dismantled a large number of buildings and have reduced the size of others, using the recovered materials in the construction of dwellings for section foremen and laborers, operators and agents, as well as some quickly-needed warehouses. We have removed the second story from a number of combination stations, and have eliminated roof projections, many of which overhung as much as 5 to 7 ft. In this way, we have obtained enough asbestos shingles to reroof a considerable number of other buildings.

The most important factor in the recovery of materials for re-use, is the alertness of the foreman in charge. He must be sufficiently interested to be watchful, to insure against damage during and after removal.

A New Viewpoint

By INSPECTOR OF BUILDINGS

Until recently, the dismantling of railway buildings was wholly a matter of expediency, little attention being given to the recovery of materials. It was the practice on many roads to allow wrecking concerns to remove the larger structures. In some cases the contractor got the material; in others, he got the salvage and, in addition, was paid a small sum for his work. In rare cases, the railway received some payment from the contractor. Smaller buildings were frequently given away or sold for small sums to persons who would take them away promptly. As a rule, when buildings were dismantled by the railway forces, only the larger timbers were saved, and such items as were recovered were not taken into stock, because the stores department opposed putting a value on second-hand lumber.

Pumps, boilers, radiators, motors and similar items were usually salvaged, but all too often the sledge hammer and acetylene torch were used to remove pipes and structural steel, without regard to their value. This was particularly true in the dismantling of power plants.

Today the whole background of dismantling is different. The acute need for materials that cannot be obtained in the market has made recovery of materials from dismantled structures imperative. Railway stocks of lumber are practically depleted, and those at the mills and in lumber yards are diminishing beyond any previous experience, being only about one-third of those of two years ago. It will be a long time now before production can even approach vital needs.

For these reasons, the only recourse for the railways is to salvage all the lumber that can be obtained from unused or abandoned buildings. Even though this is done with the utmost care, the recovered material, together with the little that can be purchased, will not be enough to meet the demand.

Reclaimed material should be prepared for re-use on the job as it is removed from the structure. The various kinds and sizes of lumber, iron and steel, brick, pipe, fittings, radiators and plumbing and electrical fixtures, should be classified carefully before they are shipped. Any nails that have been missed during removal should be pulled, and broken ends of boards should be sawed off. Brick should be cleaned and culled and scrap should be segregated from usable material.

All dismantling work should be under competent supervision, and tools suitable for the work should be used. The practice of discarding short pieces of lumber is wasteful and should not be countenanced under normal conditions. Today it is little less than criminal. Mills are now marketing croppings and other short lengths, that formerly went under their boilers, and are finding a ready sale for them.

This is no time to make a distinction between new and second-hand material. The critical procurement situation has dispelled the idea that only new material can be used. Before this war is over we will likely be glad to use to best advantage any material that we can get our hands on, whether it is new or second-hand.

Where Should Ties Be Tamped?

When ballasting, should the ties be tamped throughout their length? Why? When making a lift without ballast? If not, between what limits should the tamping be done? Does the kind of ballast or the height of the lift make any difference?

Tamp the Full Length

By G. S. Crites
Division Engineer, Baltimore & Ohio, Baltimore, Md.

Ballast transmits traffic loads from the rail and ties to the subgrade. With the increasing loads that have resulted from the necessity for getting men and materials from place to place faster, in connection with our war effort, and also in view of the fact that less and less railway labor and materials must do more and more, such labor as is available to apply ballast must be detailed to do so in the manner that will do the most good.

If the ballast is to be tamped under only a part of the tie, it will be most effective if it is placed under that section immediately beneath the rails. In this position it will act more or less as a post or column, and will depress yielding soils to form water pockets under the rails, where they will do the most harm. Besides this, the yielding soil will work upward at both the ends and the centers of the ties. If sufficiently aggravated, the water in the pockets, combining with the soil, may form mud springs or geysers in the center of the track.

When ties are tamped only at the ends on yielding subgrades, and only solid rock is unyielding under present traffic, there is an uplift of the roadbed outside the ends of the ties and in the center of the track. Such tamping forms more extensive water pockets than when the tamping is under the rails only. With the present loading of the ties by traffic, it is to be expected that there will be some deformation of the roadbed, for which reason these loads should be transmitted to the roadbed over as great an area as possible. This is done best by tamping the ties throughout their length. This can be done most effectively with power tie tampers. This applies to any lift, whether made with or without new ballast. It applies equally to all kinds of ballast and to natural soils, as well as to lifts of all heights. Obviously, these statements do not apply to the raising of low joints or to spot tamping. In these cases the tamping should be done mostly beneath the tie sections immediately under the rail.

Never Tamp Centers

By G. E. Hamilton
Roadmaster, Denver & Salt Lake, Sulphur Springs, Colo.

Whether the lift is made with or without ballast, the ties should never be tamped throughout their entire length. They should have their bearings as nearly at the ends as possible, thus allowing spring action in the track as trains pass over it. Tamping at the centers of the ties will hasten the natural subsidence of the track into the ballast, with the result that it is supported over the full length of the ties. When this happens, the track becomes "dead" and eventually center bound, necessitating a premature raise out of face.

Ties should be tamped solidly directly beneath the rail, to a point three or four inches from their ends and for 15 in. from the base of the rail toward the center. The remaining distance, approximately two feet, in the center should never be tamped. However, the hole that is left beneath the tie in this area should be shoveled full of ballast. The kind of ballast or the height of the lift has no influence on this practice.

Make Two Lifts

By George Stafford
Section Foreman, Canadian National, Redland, Alta.

When making a heavy raise on ballast, that is, one exceeding 4, in., the track should always be raised to final grade in two lifts. The amount of the first lift should be governed by the total lift, and should be such that, after settlement, the second lift will approximate two inches. If, however, the lift exceeds 12 in., as it may when taking out short sags, the track should first be raised on locomotive cinders, stone screenings, coarse sharp sand or other material that is suitable as sub-ballast, after which the ballasting should proceed as outlined. In making the initial lift on the ballast, and this should also be done on the

sub-ballast, it is important that the ties be tamped well and uniformly throughout their length.

Experience has shown that by following this procedure, better solidification and more uniform settlement will occur during the interval that elapses between the first and second lift, to allow the ballast to be compacted by traffic. At the time of the final lift, the ties should be tamped thoroughly at their ends and for a distance of 17 in. inside each rail. This will leave a space of approximately 20 in. at the center which will not be tamped, and this should be filled with ballast that is lightly compacted. Since the ties show a tendency to settle more at the ends than at the center, following this procedure will retain the resilience of the track which, otherwise, soon becomes inert or "dead," which is the final stage leading up to center-bound track.

Avoid Center-Bound Track

By T. M. Pittman
Division Engineer, Illinois Central, Memphis, Tenn.

It is assumed that the ballast raise will be one lift of 4 to 6 in. and that the surfacing without ballast will involve a lift of 1½ to 2 in. While the characteristics of different kinds of ballast vary widely and the effects of different methods of tamping are more pronounced with the different kinds of ballast, the underlying principles are the same. These principles apply also regardless of the height of the lift.

Evidently, the thought behind this question is the avoidance of center-bound track, which is caused by the ballast under the ends of the ties being weaker than in the center, permitting the ties to rock on their center like a seesaw. This cannot be overcome by any method of tamping, unless the subgrade is of ample width and the ballast shoulder extends far enough beyond the ends of the ties to keep the ballast from rolling out from under the ends.

Unless it is held in place by a good shoulder and is supported by a good subgrade, any kind of ballast will work out from under the ends of the ties and cause them to settle on their centers. This will happen also with the best of subgrades and ballast, since the ends of the ties tend to settle more than the centers.

If the ties are tamped uniformly throughout their length, the ballast at the ends will settle more than that in the center and the track will become center-bound. For this reason, it is the general practice to tamp the center of the tie lightly or not at all. However, the tie is tamped inside the rail about the same distance as it extends outside the rail. This leaves a space of about 14 to 16 in. at the center that is not compacted.

This latter practice is perhaps the best, especially for light raises, for it is difficult to control the tamping closely enough to keep from tamping the centers too much, if they are tamped at all. Foremen need to watch their work and modify their practice to suit local conditions. Generally speaking, however, in light lifts the centers of the ties should not be tamped, and with high lifts, if it is believed that sufficient ballast is not rolling under the ties, some more can be shuffled under with shovels, but not tamped.

Leave Center Untamped

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

In general, ballast lifts today are not so great as in the past, partly because most main-line track is well ballasted and partly because we are giving more attention to the quality and preparation of our ballast than formerly and are, therefore, getting a better quality of ballast material. Obviously, a raise on new ballast should be at least 1½ in. to insure a good job of tamping. If the raise ranges from this up to 4 in. the ties should not be tamped over their entire length, and the ballast should not be crowded under or compacted at the center of the ties.

In any project of general surfacing, the ties should be tamped well and solidly under the rail; out to the ends of the ties, or at least to within one or two inches of the end; and for a distance of 15 to 18 in. inside the rails. If the tamping is done in this way, it will place the track in good condition for a longer period, with little danger of center-bound track, than if the ties were tamped throughout their length. This method will give better results than any other on lines carrying fast heavy traffic.

There is no difference when making a general raise without ballast. The primary purpose of raising track is to give it resilience, and the best way to insure this desirable characteristic is to do the tamping in the manner described. There is no surer way to "dead" track than to support the ties throughout their length, and this will result in center-bound track and ties broken between the rails.

Should Trestles Be Stiffer?

Considering the density and character of present traffic, should measures be taken now to brace and stiffen pile trestles, that would not be required ordinarily? Why? What measures? How should the bracing be applied? Does the height of the trestle or the character of the stream make any difference?

Must Maintain Better

By Frank H. Cramer
Bridge Engineer, Chicago, Burlington & Quincy, Chicago

Owing to the steady increase in the volume of traffic and the higher speeds of trains, a higher standard of maintenance is required for trestles than was required formerly under normal volume and speeds. For this reason, trestles must be lined, the track must be surfaced and the chord and sway bolts must be tightened at shorter intervals. Experience has also shown that it is advisable to increase the amount of sway bracing, sash bracing, tower bracing and longitudinal bracing, or to add them to trestles upon which they were not needed previously.

Among the factors to be considered in this connection are the length and height of the trestles, the gradi- of the track, the variation between high and low water, the probable amount of drift or ice and the probability and severity of scour. Any or all of these factors may affect the arrangement of the bracing and the amount of stiffening that can or should be done. Obviously, the character and volume of traffic will also be important.

Several cases have come to my attention in which heavier locomotives were assigned to branch lines upon which the volume of traffic and the number of trains had increased. In these cases it became necessary to increase the stiffness of many of the trestles, and this was accomplished by adding tower and longitudinal braces. At many of these structures, it became necessary to place the

braces at a height that would clear ice and drift. Obviously, high trestles must be braced for normal traffic and speed; the amount of bracing, however, will depend on the factors that have been discussed.

All Should Be Braced

By S. F. Grear
Assistant Engineer of Bridges, Illinois Central, Chicago

All trestles should be braced, but there are two reasons for giving this matter special attention at this time. An unbraced trestle or one with insufficient bracing will not stay in line, and man-power needed badly for other work is required to line the track on the trestle. In some cases, lack of or insufficient or improperly-placed bracing results in slow orders, which are of no help whatever in handling the present volume of traffic.

Pile bents more than 10 ft. high should have flat timbers bolted to each pile and the cap in each bent. Bents 20 ft. or more in height require additional stories of sway bracing, preferably about 10 ft. for each story, with a collar brace between each pair of stories. When water prevents extension of the bracing to the ground, or where the ground is soft and marshy, collar or horizontal braces should be placed at the water or ground line. These collars should consist of two brace planks bolted to each pile. Frame bents must have sway bracing, regardless of their height.

Longitudinal bracing presents more of a problem, since it must be so placed that it will not present too much of an obstruction to the passage of water and drift. Where possible, longitudinal braces should be kept above high water. When this is not possible, some panels should be left open for the passage of drift.

All brace planks should be held by bolts through both the braces and the piles or posts, and bolts must be kept tight if they are to be effective. The foregoing is in line with the recommendations of the American Railway Engineering Association. Timber connectors are of great assistance in making a stronger connection between the braces and the members of the bents. In one case, we were able to abolish a slow order by placing timber connectors between the braces and the piles.

Special attention should be given to any trestles that have piles that are spaced improperly or that are driven with insufficient penetration, as these provide the worst cases of unstable trestles. Good bracing will not eliminate the basic defect of these structures, but it will help greatly to stiffen them and also to hold them in good alinement.

Conserving Sheet Packing

In what ways can the consumption of sheet packing be reduced?

Do Not Misuse

By C. R. Knowles
Superintendent Water Service (Retired) Illinois Central, Chicago

There are various kinds of sheet packing, but rubber is a component of almost all of them. Rubber is one of our most critical materials, and unlike many of the materials that are classed as critical, this country does not produce the raw materials to offset our consumption or supplement our supply. It is of the utmost importance, therefore, that we reduce the consumption of sheet packing by both the prevention of waste and the use of suitable substitutes.

One of the principal wastes of sheet packing results from carelessness in cutting gaskets from the sheet. Even with the greatest care, some waste is unavoidable. For example, a ring gasket for an 8-in. flanged joint will require a sheet at least 10 in. square, having an area of 100 sq. in., while the total area of the finished gasket is less than 25 sq. in. Unless care is exercised in cutting the gasket from the sheet and then in using the center and other portions of the sheet to best advantage, the waste will amount to 75 per cent of the original sheet. The same rule applies in greater or less degree to gaskets of any size or shape. The use of ring gaskets instead of full-face gaskets, will require less sheet packing because of the smaller circle. Prefabricated or moulded gaskets will eliminate waste and reduce the amount of material required. Soft-rubber packing for cold-water pumps should not be used for steam joints or on internal combustion engines, as it is not suitable for high temperatures. Neither is it economical to use a hard composition packing for cold water. Packing ⅛ to ¼ in. in thickness is sometimes used where the same material 1/16 in. thick will serve as satisfactorily. The result of this practice is that the amount of packing consumed is two to four times the amount necessary. Clean, smooth, well-fitting joint faces will permit the use of a thinner sheet and will, at the same time, make a better joint than where thicker packing is used.

Sheet packing should never be used for purposes other than that for which it was designed. It is sometimes used for mats around electrical equipment, for door mats and for shields to prevent the splashing of oil or water. It is also used for making improvised hinges for cupboards and other light doors; for soles and heels for shoes, as shims for bearings and for other purposes foreign to its intended use. An excess supply of packing should not be kept on hand, beyond immediate requirements, as this material deteriorates with age and it may become damaged by heat; or it may become oil-soaked or otherwise injured.

Many different materials can be substituted for rubber sheet packing. This list includes stencil and roofing paper, sheet asbestos, plywood, veneer, sheet lead and cloth or canvas. The latter may be painted with white lead to add body and make it impervious to water. Leather may also be used for cold-water hose lines and plumbing fixtures. In some cases it is more satisfactory than rubber or other material, but leather is also a critical material.

Carelessness Brings Waste

By Supervisor of Water Service

Consumption of packing could be reduced considerably if the two principal sources of waste were eliminated, namely, carelessness and improper use. More than once I have seen water-service repairmen cut gaskets from sheets and throw the cores or inner discs away. I hasten to assure you that these men were not working for me or the practice would have ceased right there. There is no reason why the trimmings should not be saved and used for cutting smaller gaskets, down to those used in plumbing fixtures.

In other cases, I have seen large sheets of rubber packing spread out on work benches for laying out parts of equipment that was being cleaned or repaired. I have seen them used

as pads under glass tops for desks; I have seen more than one pair of shoes soled with sheet packing; I have seen rubber sheets used as aprons to keep clothes clean; and I have seen this material misused and misapplied in numerous other ways.

Only a careless or indifferent repairman, or one who is too lazy to keep needed materials in his kit, would use soft rubber packing in hot water lines. This is only an illustration, but it typifies a considerable range of careless practices. In other words, if the right kind and thickness of packing are used, not only will material be conserved, but much needless labor will be avoided.

A source of waste that can be eliminated easily without interfering with effective maintenance is the elimination of unnecessary stocks of packing. Too much stock of any item tends toward misuse, carelessness in use and other forms of waste. In addition, rubber sheet packing deteriorates rapidly and soon becomes unfit for use.

Spot Tampers for Sections

To what extent is it desirable to equip section gangs with spot tampers? Why? How many? Will they increase the output of the gang? If so, how much?

Produce Superior Tamping

By A. A. Miller
Chief Engineer Maintenance of Way, Missouri Pacific, St. Louis, Mo.

All section gangs maintaining track on coarse or heavy ballast, such as slag, crushed stone, washed gravel, etc., should be equipped with spot tampers. Those maintaining track on light-traffic, medium-speed branch lines, ballasted with chatts, cinders or similar light ballast do not need mechanical tampers, since hand tools will give reasonably satisfactory results for the class of service demanded. Mechanical tampers produce a superior quality of tamping, much finer and more uniform than hand tamping, and insure better surface and smoother-riding track under heavy, high-speed trains.

Tamping with picks, bars or other hand tools does not produce a uniform job. No two sets of men will tamp exactly alike. Some will do a tight and thorough job; more will do a fair job under the ends of the ties, but will not bend their backs enough to force the ballast under the portion of the tie that supports the rail directly; while still others will merely tamp to the sides of the ties and never reach the open spaces under any part of the tie. Under best conditions, there is a wide variation in the character of hand tamping, the net result of which is a poor-riding section after a few trains have passed over the track.

On the other hand, men using mechanical tampers can stand more nearly erect while working; they learn quickly to handle the machines with little effort, and how to do a thorough job of tight tamping under the ties. The result is a smooth surface, an excellent riding condition and track that stands up under high-speed heavy traffic with little and infrequent reworking or spotting.

Every section on high-speed, heavy-traffic lines should be equipped with two unit tampers. A gang consisting of a foreman and three laborers can use two tampers in spot work and, in addition, can complete a considerable mileage of out-of-face surfacing, by doubling up with neighboring sections, thus getting the benefit of four tamping units. We find the output of a section gang increased by 20 to 50 per cent through the use of mechanical tampers.

My experience is that our trackmen-laborers, foreman and on-the-ground supervisory officers—are all enthusiastic over the results obtained with mechanical tie tampers. The men are aware of how much labor it saves them, and the foremen and supervisors appreciate the increased output and better quality of work.

They Do Increase Output

By C. M. Chumley
Engineer Maintenance of Way, Illinois Central, Chicago

Where slag or rock ballast is in use, it is desirable to equip all section gangs with either self-contained single-unit or two-tool wheel-mounted spot tampers. Where these power-driven tools are employed, it is not necessary to remove the ballast from the cribs to reach the bottom of the tie, as it is when using tamping picks. Less time is used in tamping each tie, the work is more uniform and stands up longer.

The average section gang should be provided with two tampers of the unit type or with one of the two-tool type. Our experience has been that when smoothing tracks, spot tampers will increase the output of section gangs 50 per cent or more. The return on the investment in these tools depends largely on the manner in which they are maintained and the amount of time they are used.

Rail Oilers on Hump Tracks

What advantages, if any, are there in installing rail-and-flange lubricators on hump tracks in classification yards? What disadvantages? Should they be installed ahead of or behind the initial car retarders?

Saves Manual Labor

By C. H. R. Howe
Cost Engineer, Chesapeake & Ohio, Richmond, Va.

The principal advantages obtained through the use of rail-and-flange lubricators on hump tracks are the saving of manual labor and of wear on switch points and curved lead rails in turnouts. The location of the lubricators will be determined, in general, by attendant local conditions. Ordinarily, the most advantageous location should be as near the top of the descending grade as possible. Here the car movement is slowest, which permits a more uniform deposit of grease on the flanges without splashing. Care should be exercised to avoid excess deposits by the lubricators on the wheel flanges, for such excess might affect the action of the retarders.

Prefers Hand Application

By Division Engineer

I am a firm believer in the use of grease on curves. It has done more to protect the rail on curves against wear than anything else that has been tried. While reduction in wear on wheel flanges cannot be demonstrated with the same certainty, it

stands to reason that it must be at least comparable to that on rail. In addition, consistent and systematic use of these lubricators will increase the tonnage of freight trains where curvature represents a considerable part of the alinement.

It seems obvious that the same advantages, that is, reduced wear on the turnout rails and smoother movement through turnouts, can be claimed for rail-and-flange lubrication in hump tracks. However, there are men at hump yards whose principal duties are to maintain the car retarders, the switch lamps and the switch stands. One of these men can apply lubrication by hand to the rail at suitable points, to better advantage than can be done by mechanical lubricators.

This is not a condemnation of the lubricating machine for we have a relatively large number on this division, all of which are doing splendid work. It should be recognized, however, that a switching hump, with its sharp gradients and diverging tracks, each of which requires a turnout, is far different from a continuous main-line track, and requires a different lubricating technic. My observation leads me to believe that better results will be obtained from hand lubrication than from automatic machine lubrication.

If mechanical lubrication is employed, I do not see that it makes a great deal of difference whether the lubricators are placed before or behind the initial retarders, since lubrication of the wheel flanges will not affect the operation of the retarders. The principal requirement is that the application be made where it will give best results in movement of cars.

Maintaining Interior Walls

In what ways can labor and material be conserved in the maintenance of interior wall surfaces? What are the advantages? What precautions are desirable?

Mentions Many Ways

By A. L. Sparks

Architect, Missouri-Kansas-Texas, St. Louis, Mo.

Perhaps the greatest saving in the maintenance of wall surfaces can be effected at the very beginning by constructing them with materials that require little or no subsequent repair. No doubt there are many rooms, the walls of which are lined with marble or tile, on which there has been no maintenance expense for a hundred years, other than the cost of the labor and soap for frequent washings. On the other hand there are rooms of the same dimensions which have walls covered with wall paper, on which, over a period of years, the cost of maintenance has exceeded the difference in the cost of construction of the two types.

It is probable that decorative glass will figure largely as a low-maintenance wall-surface material in the future. It can be had in many colors and even now is not on the list of restricted materials. It can be cleaned so easily that the cleaning resolves itself into little more than a large-scale window-washing job. Glass blocks much used in construction today also present similar qualifications, where walls of a permanent nature are desired. Terra cotta blocks, enameled hollow building tile and enameled brick have long been used on some types of buildings and require no maintenance expense other than washing.

For buildings of lighter construction and for partitions, modern wall board is rapidly replacing some other types of surfacing. Standard construction of average combination stations in the past has called for walls and ceilings of lined, matched and beaded wood boards, often made of none-too-well-seasoned lumber. When the boards seasoned, often there are cracks where smoke, dust, soot and cobwebs collect, and through which the wind filters more dirt, so that cleanliness is almost impossible.

If washing is attempted, the dirty water in the joints runs down over the flat surfaces, leaving streaks and creating an appearance more unsightly than that of the uniformly dirty surface which existed before the attempted cleaning. Generally, repainting on such walls results in discouraging appearances, for the wet paint brush drags the accumulated dirt out of the cracks, smears it across the surface and brings forth a streaked or smeared appearance.

Wall boards, which usually come in 4 ft. by 8 ft. sheets, when applied properly with either calked joints or joint covers, present smooth monolithic surfaces which can be washed or repainted without streaking. Then too they can be painted with one of the many casein paints or cold water paints, which can be removed with sponge and water by inexperienced help, whereas oil paint can not be removed satisfactorily from matched and beaded wood boards by any reasonable process, and with the accumulation of coat on top of coat over a period of one or two decades, the surface scales like a snake shedding his skin.

With the change of old wall surfaces from matched and beaded to smooth wall board, sanitation and health conditions are improved noticeably. The very atmosphere of the rooms is changed, for on windy days the cracks in the old ceiling actually exude odors from under, over and around the room. At present the use of all hard surfaced wall boards, made of plywood, wood pulp, asbestos cement, enameled metal, plastic sheets, etc., are subject to restrictions, but so is matched and beaded wood, which costs more than some of the others.

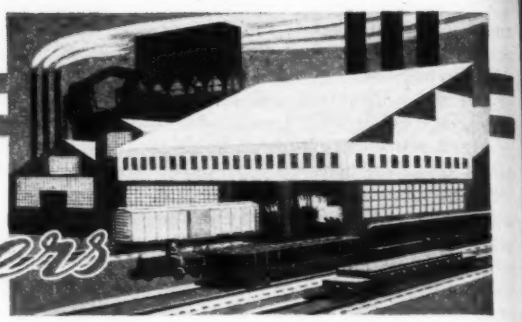
On brick walls, hard wall plaster or portland cement plaster continues to be the surfacing most commonly used. Priority assistance is not required for the purchase except where lathing is needed. Hard plaster walls of smooth finish are not expensive to maintain, but rough walls are more expensive and not as sanitary.

Many Modern Materials

By General Inspector of Buildings

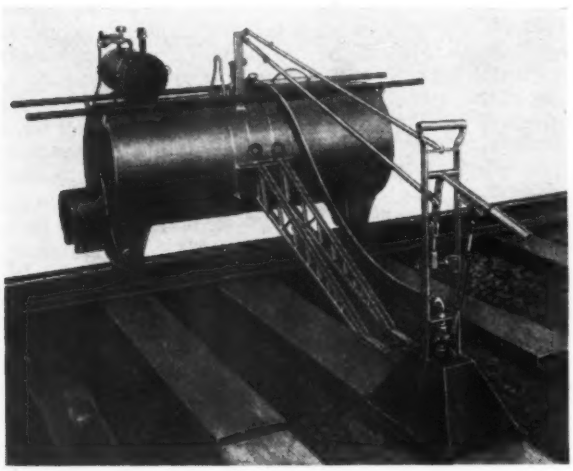
For the present, there is little opportunity to conserve either labor or materials in the maintenance of interior wall surfaces, because so many of the materials that have been used in the past, such as metal lath, beaded ceiling, hardwood molding, etc., are on the critical list and some are so scarce that they are unobtainable, regardless of priorities. However, there are numerous new wall materials that can be used to advantage, some of which are not under priority, and all of which can be obtained, that can be used to advantage from the standpoint of low labor cost of application and reduced future maintenance requirements. These materials were just beginning to attain acceptance on their merits, in the building modernization programs that were gaining momentum when our entrance into the war put a stop to this movement. Some of them can be applied over existing walls and thus reduce labor requirements materially. Others are not quite so simple to apply, but even at that are inexpensive, compared with past practices. It will be well for building officers to study them thoroughly, for they offer many advantages.

PRODUCTS of Manufacturers



Improved Woolery Creosote Spraying Machine

THE Woolery Machine Company, Minneapolis, Minn., has made a number of improvements in its creosote sprayer machine, which is used in rail laying work to apply creosote uniformly on the newly adzed surfaces of crossties. The new machine has a 60-gal. tank twice the size of that on the older model; a pump located inside the tank; and a gasoline heater to heat the creosote.



The New Woolery Creosote Spraying Machine Has a Heater and the Pump Is Located Inside the Tank

The new creosote spray machine, which weighs 250 lb., consists essentially of a cylindrical creosote tank with pump and heater, mounted on double-flanged rollers and a pyramid-shaped hood with spray nozzle supported by two pivoted outriggers arms. The tank is made of 16-gage sheet metal, arc-welded with dished ends. Lift handles are provided at both ends of the tank for lifting the unit off the track by hand and an eye is installed on the top of the tank at the center of gravity, to enable it to be lifted with a crane. A large drain plug is located at one end to permit the tank to be emptied completely for cleaning. The double-flanged rollers have roller bearings and large internal lubrication chambers, which need be serviced only once each season.

The gasoline burner is located at one end, near the bottom of the tank and operates in a 6-in. flattened heater tube which extends lengthwise of the tank from one end nearly to the other end and up through the top. Fuel for the burner is supplied from a small gasoline tank mounted on top of the creosote tank.

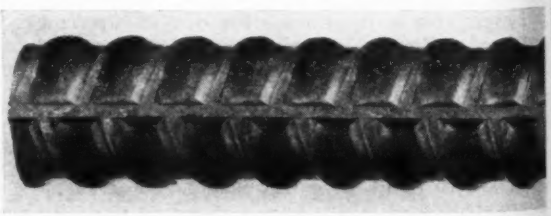
The pump for forcing the creosote through the spray nozzle is located inside the tank near the bottom, where it is submerged and, consequently, always primed. The heater tube passes around the pump, thereby keeping it warm, so that it operates freely even in cold weather. The pump is surrounded by a full length perforated metal screen, which can be removed readily with the pump for cleaning. The pump outlet is connected to the spray head by a hose.

In its operation, the tank of the sprayer is pushed along on the rail by one man. Another man raises and lowers the hood at each tie. The operation of lifting the hood by the handle works the pump plunger and draws in a metered charge of creosote. Pushing the handle down forces the creosote out of the nozzle in a fan-shaped spray, which revolves with the downward movement of the handle. The stroke of the pump may be adjusted to regulate the volume of creosote applied and the area covered may also be regulated. The pivoted outriggers permit the tank to be pushed along the rail at a steady pace while the hood travels intermittently from tie to tie.

It is said that two men can do a first-class job of applying creosote with this machine in much less time than by hand-swabbing or by broom and pail. In addition there is no waste of creosote, even on windy days and the machine prevents the creosote from coming in contact with the workmen's hands and clothing.

New Type of Reinforcing Bar

A NEW type of concrete reinforcing bar, called Inland Hi-Bond, has been developed by the Inland Steel Company, Chicago, which is said to be scientifically designed to give the greatest possible bonding value be-



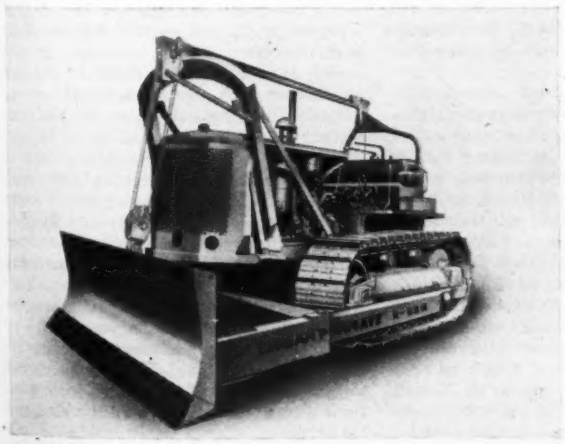
The Inland Hi-Bond Reinforcing Bar Increases the Effectiveness of Reinforcing Steel in Concrete Through Greatly Improved Load Transfer

tween concrete and steel and to represent the first real improvement in the bonding value of concrete reinforcing bars in more than 30 years. The new reinforcing bar increases the effectiveness of reinforcing steel in concrete through greatly improved load transfer, which is accomplished by means of reversed double helical ribs of proper height, extending between diametrically opposed longitudinal ribs. The helical ribs are spaced at close intervals and so dimensioned as to provide potential bearing and shearing areas, which, in addition to having the proper relationship to each other, are properly proportioned to the effective strength of the bar. The bearing area is more than double that of the usual commercial types of reinforcing bars.

It is expected that this development will lead eventually to revisions of existing building codes to take advantage of the greater bond strength, thereby resulting in more efficient structures, conservation of materials and labor.

LaPlante-Choate Trailbuilder

THE LaPlant-Choate Manufacturing Company, Inc., Cedar Rapids, Iowa, has developed a new, cable-operated "Trailbuilder" earth mover for mounting on a Caterpillar D-8 tractor. The unit, which is designated as model R-82R, embodies all of the structural features of the company's dozer line, including welded steel construction, box channel frame, box plate blade, pressed and formed sections and a cutting edge reinforced with more bolts than earlier models. The blade is 154 in. wide and 41 in. high. It has cutting bits at either end, and the center section of the cutting edge is reversible. The three-position blade can be angled either to the left or the right, or held in straight bulldozing position, while either end of the blade can be tilted up or down with a variation of 14 in., regardless of the position of the blade. A Caterpillar double-drum power control allows the blade to be raised a maximum of 50 in. or dropped 72 in. below the ground line. The front overhead scaffold is a new design to provide greater strength and improved appearance. A single cable is used, and the shipping weight of the entire unit is 6,890 lb. A feature of the general construction is the provision for the operator of an unobstructed view of the blade ends, which is permitted by the ample clearance of the overhead scaffold, both in height and width.

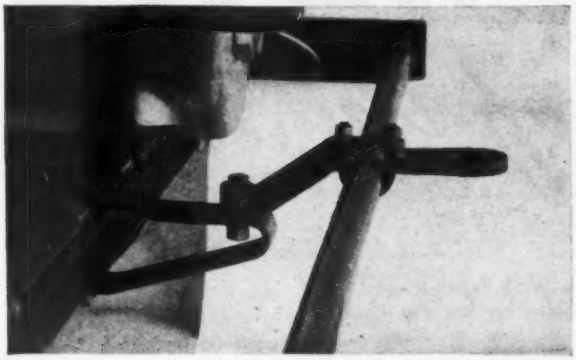


The New Trailbuilder Is Cable-Operated

which are single plates formed to fit the ends of the blade to provide greater wear resistance in rock cuts,

Fairmont Front-End Draw Bars for Motor Cars

FAIRMONT Railway Motors, Inc., Fairmont, Minn., has developed a front-end draw bar for three of its standard section cars, the S2, Series E, ball bearing engine model; and the S2 Series F and the S2 Series G, roller bearing engine models. The draw bars will fit either the one-speed direct belt-drive cars, or the two-speed gear-driven cars. To install the draw bars on cars requires only the drilling of two holes in the flange of the front cross beam of the frame.



Close-up of the New Front-End Draw Bar

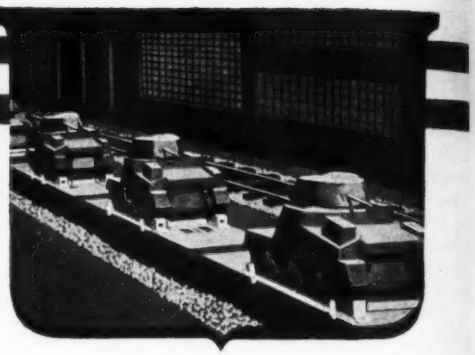
These draw bars permit the motor car to tow trailers when traveling either forward or backward and eliminate the need for turning the car around when the direction of travel is reversed.

Wilson Aluminum-Bronze Electrode

WILSON No. 200, a new coated high tensile aluminum-bronze shielded-arc electrode, which can also be used as a filler rod in carbon arc welding, has been developed by the Wilson Welder & Metals Co., North Bergen, N. J. The new electrode has a wide application in the welding of most bronzes, malleable and cast iron or steel. In addition, it has other specific applications for which it is specially suited, such as welding manganese bronze conforming to Federal Specifications OO-B-726b, or Navy Specifications 49-B-2e for welding parts where great strength, ductility and corrosion resistance are strict requirements.

The No. 200 aluminum-bronze shielded-arc electrode can also be used for welding dissimilar metals, such as cast iron to brass, steel to malleable iron, or the joining of any two metals which are weldable with alminum-bronze. The deposits of this electrode are said to be superior to standard manganese bronze with respect to corrosion resistance, and equal to it in strength, hardness and ductility. The electrode is available in sizes ranging from ⅛ in. to 3/16 in. in 14-in. lengths and ¼ in. in 18-in. lengths. Sizes from 5/16 in. to ½ in. in 18-in. lengths may be procured on special order.

NEWS of the Month



Capital Expenditures Show Decline For 1943

Capital expenditures for equipment and other improvements to railway property made by Class I railroads in 1943 totaled $454,282,000, a decrease of $80,615,000 below those made in the previous year, according to the Association of American Railroads.

Of total capital expenditures made in 1943, $255,981,000 were for locomotives, freight-train cars, passenger-train cars and other equipment and $198,301,000 for roadway and structures. Capital expenditures for equipment in 1943 were $93,393,000 below those in 1942, while expenditures for roadway and structures were $12,778,000 above the preceding year.

Of the $198,301,000 spent for roadway and structures, about half went for the improvement of tracks and sidings. For additional track, capital expenditures in 1943 totaled $18,493,000, or nearly three times that spent for that purpose in the preceding year.

105,901 Women Now Working on Railroads

In the three-month period ending in mid-January, the total of women employed on Class I railroads increased from 103,209 to 105,901, according to a recent report of the Bureau of Transport Economics and Statistics of the Interstate Commerce Commission. This figure represents 7.80 per cent of the total railroad employees, as compared with the number of women workers in January, 1943, which was 63,187 or 4.79 per cent of the then total of 1,319,480. In maintenance of way and structures, the increase in the comparable period was from 745 to 2,402. The largest number of women in railroad employ continues to be in the professional, clerical and general division, where the increase from mid-January, 1943, to the same time this year was from 48,138 to 70,379.

Authorization For Ordering Track Materials

The War Production Board has authorized the railroads to place orders for additional quantities of track materials, up to 20 per cent of approved allocations for such equipment as frogs, switches and other items, to balance additional quantities of new rail that it is anticipated will be allocated to them during the third and fourth quarters of 1944. This action, covered by the issuance of Direction 2 to Preference Rating Order P-142, states that such orders for track materials are not to be confused with track accessories; neither can such orders for track materials be used to obtain any equipment other than to accompany the quantity of new rail which may be authorized for each railroad.

Puerto Rico May Supply 2,000 M. of W. Workers

A recruiting campaign undertaken by the War Manpower Commission may result in Puerto Rico sending to the United States 2,000 unskilled workers for employment in railroad maintenance, the commission announced on April 14. The campaign is being handled by the United States Employment Service and railroad representatives will be sent to the San Juan, P.R., office of that organization to select workers.

J. Monroe Johnson Named to Head O. D. T.

President Roosevelt last month appointed Interstate Commerce Commissioner J. Monroe Johnson as director of the Office of Defense Transportation to fill the vacancy created by the recent death of Joseph B. Eastman. Colonel Johnson will continue to be a member of the commission, with relief from outside duties, but will continue to serve on Division 3 and will retain supervision over the Bureau of Service. His role with the commission will therefore be larger than was that of Mr. Eastman, who functioned under leave-of-absence arrangements which brought him into commission deliberations only when his vote was necessary to break a tie.

Brigadier-General Charles D. Young has been acting director of O.D.T. since Mr. Eastman's death, and Colonel Johnson immediately expressed the hope that General Young would continue in the position of deputy director which he held under Mr. Eastman. General Young stated on April 5 that he expected to do so. Colonel Johnson further said that he anticipates that the O.D.T. will continue to function much the same as in the past. He expects the country's transportation agencies to continue to meet the wartime demands on them, although he added what he said was "nothing new"—that the manpower situation is the "critical" problem.

May Defer Few Key Men Under 26

Colonel J. Monroe Johnson, director of the Office of Defense Transportation, announced last month that deferment of a small number of men under 26 years of age who are in key transportation jobs would be permitted under the revised Selective Service regulations designed to speed up the induction of men in this age group into the armed forces. Col. Monroe's statement was amplified on April 11 by a Selective Service announcement setting forth the limited list of war activities within which registrants in the 18-to-26 year group may be considered as eligible for deferment upon recommendation of state directors of Selective Service.

State directors have been authorized to exempt key personnel of the railroads, Great Lakes and inland waterways, air lines, and motor truck firms, and O.D.T. recommendations will be given weight as to these branches of transportation, it was indicated, subject to such quota limitations as may be approved by Selective Service headquarters in conjunction with the inter-agency manpower committee at Washington, D.C.

The recommendations of the O.D.T. will be considered in the exemption by state Selective Service directors of men under 26 in cases of personnel "engaged in railway and motor transport service directly related to the movement of war freight necessary to support the immediate war objectives, the withdrawal of which would decrease the safety, speed, and volume of movement so as to adversely affect such war objectives." Eligible railroad employees were further described as those "engaged in assembly, line haul, and break-up of railway freight trains," while eligible motor transport employees were further limited to "key personnel of those trucking companies whose equipment is more than 16,000 tons gross weight of vehicles." Comparable restrictions were set up for for-hire trucking and for licensed officers in Great Lakes and inland waterways operations. Consideration for airline employees was provided for in the case of flight personnel and of that ground personnel outside continental United States.

Personal Mention

General

J. F. Beaver, roadmaster of the Charlotte division of the Southern at Greenville, S.C., has been promoted to trainmaster on the Danville division, with headquarters at Danville, Va.

John L. Pickles, superintendent of the Duluth, Winnipeg & Pacific (a subsidiary of the Canadian National), with headquarters at Virginia, Minn., and an engineer by training and experience, has retired.

D. D. Low, roadmaster on the Canadian National, with headquarters at Regina, Sask., has been promoted to assistant division superintendent, with headquarters at North Battleford, Sask., succeeding **A. C. Nicholls,** who has been transferred to Melville, Sask., in place of **C. B. Mutchler,** who has retired.

John A. Rogers, general superintendent of the Alberta district of the Western region of the Canadian National, with headquarters at Edmonton, Alta., and an engineer by training and experience, has been promoted to general superintendent of transportation of the Central region, with headquarters at Toronto, Ont.

Engineering

Spencer R. Sproles, principal assistant engineer on the Gulf, Mobile & Ohio, with headquarters at Mobile, Ala., has been promoted to assistant chief engineer with the same headquarters.

Frank L. Etchison, whose promotion to engineer maintenance of way of the Atlantic Coast Line, with headquarters at Savannah, Ga., was reported in the March issue of *Railway Engineering and Maintenance,* was born at Baltimore County, Md., on February 27, 1902. He attended George Washington University at Washington, D.C., and entered railroad service in the roadway department of the Baltimore & Ohio, serving as trackman, relief foreman, clerk and assistant to supervisor in Gaithersburg, Md. He joined the Atlantic Coast Line as a rodman at Ludowici, Ga., in April, 1924, and in May, 1925, was promoted to instrumentman. In August of the same year he was transferred to the Charleston & Western Carolina on grade revision work. He was sent to Monticello, Fla., as resident engineer in June, 1926, and assumed the same post at Perry, Fla., the following month. In February, 1927, he became resident engineer at Orlando, Fla., being promoted to the position of roadmaster at Live Oak, Fla., in November, 1927, and transferred to Charleston, S.C., in April, 1929. Mr. Etchison held the position of general roadmaster of the Northern district of the Northern division, to which he was appointed in May, 1940, until his present appointment as engineer maintenance of way at Savannah, Ga.

Joseph L. Loida, whose promotion to assistant chief engineer of the Illinois Terminal Railroad Association, with headquarters at St. Louis, Mo., was reported in the February issue, was born at St. Louis on June 20, 1891, and entered railway service on September 16, 1911, as a chainman on the East St. Louis, Columbia and Waterloo (now abandoned) with headquarters at Columbia, Ill. In 1912 he went with the Wabash as a rodman at Edwardsville, Ill., later serving in various capacities on the Missouri Pacific at Poplar Bluff, Sedalia and St. Louis. In July, 1914, Mr. Loida was appointed a draftsman in the office of the chief engineer of the St. Louis-San Francisco (Frisco), with headquarters at St. Louis, later being engaged in construction work at various points on that road. In 1918 he returned to the Missouri Pacific as a draftsman, with headquarters at St. Louis, and in April, 1920, he went with the St. Louis, Troy & Eastern (now part of the Illinois Terminal Railroad Association), with headquarters at St. Louis. In December, 1927, Mr. Loida was promoted to chief engineer, with the same headquarters, and when the St. L. T. & E. became part of the I.T.R.A., he was appointed staff engineer. In August, 1931, he was advanced to valuation engineer, holding that position until his new appointment.

Joseph L. Loida

George Roy Doull, whose appointment as bridge engineer of the Canadian National, Atlantic region, was reported in the April issue, was born at New Glasgow, N. S. Following service with the Maritime Bridge Company at that place, he joined the service of the Canadian Government Railways on August 28, 1914, as a tracer on the construction of the Halifax Ocean Terminals. In August, 1916, Mr. Doull was promoted to draftsman, and in November of the same year he was transferred to Moncton, N. B., from which point he was moved to Toronto, Ont., in May, 1921, as an assistant engineer. In July, 1943, Mr. Doull returned to the engineering department at Moncton, where he remained until his present appointment as bridge engineer of the Atlantic region.

Albert Menger Zabriskie, assistant chief engineer of the Central of New Jersey, has been promoted to chief engineer succeeding the late **Arthur E. Owen,** whose death on March 21 was reported in the April issue.

Robert S. Anderson, principal assistant engineer in the office of the chief engineer of the Pittsburgh & West Virginia, has been appointed engineer maintenance of way of that road with headquarters at Rook, Pa.

R. W. Seniff, chemical engineer of the Alton, with headquarters at Bloomington, Ill., has been appointed engineer of tests, with the same headquarters, and the position of chemical engineer has been abolished.

G. L. Brown, roadmaster on the Missouri Pacific, with headquarters at Poplar Bluff, Mo., has been promoted to division engineer of the Joplin-White River divisions, with headquarters at Nevada, Mo., succeeding **W. Rambo,** who has been transferred to the Omaha-Northern Kansas divisions, with headquarters at Falls City, Neb., replacing **J. H. McFadden,** assigned to other duties.

H. E. Perkins, an assistant engineer on the Baltimore & Ohio at Wheeling, W. Va., has been promoted to division engineer at the same point, succeeding **J. H. Lindsay,** who has been transferred to Grafton, W. Va., to replace **Guy Long.** Mr. Long is moved to Connellsville, Pa., replacing **W. E. Kearfott,** who has been transferred to Akron, Ohio, where he succeeds **E. J. Clopton,** who is transferred to Cumberland, Md., replacing **H. L. Exley,** whose appointment as division engineer at Cumberland was reported in the April issue.

A new engineering district has been created by the Northern Pacific with headquarters at Livingston, Mont., and the district engineers and their new jurisdictions will be as follows: **H. F. Brown,** lines east of Mandan, N. D., with headquarters as before at St. Paul, Minn.; **H. M. Tremaine,** lines Garrison, Mont., to Yakima, Wash., with headquarters as before at Spokane, Wash.; **G. I. Hayward,** lines west of Yakima, Wash., with headquarters as before at Seattle, Wash., and **V. A. Bennett,** lines Mandan to Garrison, with headquarters at Livingston. Assistant engineers in charge of operating divisions will hereafter be designated as division engineers.

J. T. Derrig, acting assistant chief engineer of the Northern Pacific, Lines West of Garrison, Mont., with headquarters at Seattle, Wash., has been promoted to assistant chief engineer, with the same headquarters, succeeding **A. F. Stotler,** who has been on leave of absence because of illness. Mr. Stotler has been appointed advisory engineer, with headquarters at Seattle. **H. R. Peterson,** office engineer, with headquarters at St. Paul, Minn., has been advanced to principal assistant engineer, with the same headquarters, and **J. E. Hoving,** assistant engineer at Duluth, Minn., has been promoted to office engineer, with headquarters at St. Paul, succeeding Mr. Peterson.

Albert H. Simon, chief draftsman in the building department of the Chicago, Burlington & Quincy, with headquarters at

Chicago, has been promoted to assistant structural engineer, with the same headquarters, a newly-created position. Mr. Simon was born at High Bridge, Wis., on July 9, 1888, and graduated from the University of Wisconsin in 1912. He entered railway service with the Burlington in 1922 as a structural designer, and in 1923 he was advanced to estimator and checker on buildings, with headquarters at Chicago. In 1926, Mr. Simon was advanced to chief draftsman, with the same headquarters, holding that position until his new promotion.

George T. Donahue, whose promotion to district engineer of the New York Central Lines West of Buffalo, with headquarters at Cleveland, Ohio, was reported in the March issue, was born at Watertown, N.Y., and received his higher education at Ohio State University. He entered railway service as a transitman of the N.Y.C. at Rochester, N.Y. From 1918 to 1926 he served as assistant supervisor of track, with the same headquarters, and in the latter year he was promoted to assistant division engineer at Rochester. In 1929 Mr. Donahue was transferred to Syracuse, N.Y., and one year later he was advanced to supervisor of track, with headquarters at Watertown. In 1934 he was transferred to New York and in 1937 he was advanced to special engineer in the office of the chief engineer, being promoted to division engineer, with headquarters at Chicago in 1942. In 1943 Mr. Donahue was advanced to assistant district engineer, with headquarters at Cleveland, the position he held at the time of his new appointment.

George T. Donahue

Jack Stewart, assistant division engineer of the Southern Pacific at El Paso, Tex., has been promoted to division engineer of the Salt Lake division, with headquarters at Ogden, Utah., succeeding **G. L. Morrison,** who has been transferred to the Shasta division, with headquarters at Dunsmuir, Cal., relieving **G. M. Taylor,** assigned to other duties.

Mr. Stewart was born at Denison, Iowa, on March 7, 1899, and received his higher education at Healds Engineering College, San Francisco, Cal. He entered railway service on March 10, 1919, as a lovelman on the Southern Pacific at Dunsmuir, subsequently holding various positions in the engineering department until October, 1930, when he was promoted to roadmaster, with headquarters at Alturas, Cal. Mr. Stewart later served in that capacity at Yuma, Ariz., and Los Angeles, Cal., and in May, 1942, he was advanced to the position he held at the time of his new appointment.

Bridge and Building

David Lavoie, a bridge and building inspector on the Boston & Albany, has been promoted to the newly-created position of assistant supervisor of bridges and buildings on the Albany division, with headquarters at Springfield, Mass.

Track

George W. Schrader, whose promotion to track supervisor on the Pere Marquette, with headquarters at Saginaw, Mich., was reported in the April issue, was born at Steiner, Mich., on August 1, 1906, and entered railway service on June 16, 1922, with the Pere Marquette. On May 15, 1926, he was appointed track foreman, with headquarters at Steiner, and on April 16, 1935, he was transferred to Monroe, Mich. On September 7, 1943, Mr. Schrader was advanced to track inspector, and on December 22 of the same year, he was promoted to assistant track supervisor, with headquarters at Saginaw, holding that position until his new appointment became effective on March 10.

R. G. Wharton, assistant track supervisor on the Gulf, Mobile & Ohio, with headquarters at Tuscaloosa, Ala., has been promoted to track supervisor, with headquarters at Laurel, Miss.

M. J. O'Connor, whose appointment as supervisor of track on the Pittsburgh & Lake Erie, with headquarters at Beaver Falls, Pa., was reported in the March issue, was born on May 20, 1890, at Aliquippa, Pa. After a public school education, he entered railway service on May 1, 1900, as a material checker on the P. & L. E. and has served continuously with this company since that date. In April, 1911, he was advanced to track foreman and on August 1, 1920, he was promoted to assistant supervisor of track which position he was holding at the time of his recent appointment to supervisor of track, effective February 1.

W. M. S. Dunn, whose appointment as supervisor of track on the Chesapeake & Ohio, with headquarters at St. Albans, W. Va., was reported in the April issue, was born at Covington, Ky., on June 22, 1906. After attending Virginia Military Institute, Mr. Dunn entered railway service with the C. & O. on January 1, 1925, as a chainman on the engineering corps, serving in this capacity and as a rodman until 1929. He then became a draftsman in the office of the engineer maintenance of way at Richmond, Va., where he remained until 1937, when he was promoted to assistant cost engineer on the Logan division. He remained in the latter capacity until his recent promotion.

B. P. Brevard, supervisor of track on the Illinois Central at Leland, Miss., has been transferred to Clarksdale, Miss., succeeding **W. H. Wood,** who has retired. **M. F. Ward,** supervisor of track, with headquarters at Princeton, Ky., has been transferred to Tutwiler, Miss., replacing **M. A. Youngblood,** who has been transferred to Leland, relieving Mr. Brevard. **W. R. Pruitt,** who has been honorably discharged from the U. S. Army, has been appointed acting supervisor of track, with headquarters at Princeton, the position he held before going into the armed services. **E. L. Caldwell,** supervisor of track, who has been on leave of absence, has returned to his headquarters at Jackson, Miss. **W. N. Young,** acting supervisor of track at Jackson, has been transferred to Baton Rouge, La., replacing **K. S. Sale,** who has been granted a leave of absence.

W. P. Nichols, whose promotion to general track supervisor on the Chesapeake & Ohio, with headquarters at Richmond, Va., was reported in the April issue, was born on June 30, 1891, at Blowing Rock, N.C., and after a public school and business college education, he entered railway service with the Chesapeake & Ohio on May 6, 1912, as a section laborer. On March 20, 1915, he was advanced to assistant foreman on the Hinton division, and on July 1, 1916, he was promoted to section foreman at Fayette, W. Va. A short time later he was further promoted to extra force foreman on the Hinton division, and on May 20, 1920, he was advanced to supervisor of track, with headquarters at Raleigh, W. Va., being transferred to the Cincinnati division, with headquarters at Riverton, on November 20, 1927. He was holding the latter position at the time of his recent promotion to general track inspector.

George Caraboa, whose promotion to supervisor of track on the Cleveland, Cincinnati, Chicago & St. Louis (Big Four), with headquarters at Indianapolis, Ind., was reported in the April issue was born in Greece on December 19, 1895, and entered railway service on July 18, 1912, as a section laborer of the Big Four at Kankakee, Ill. On September 1, 1917, he was promoted to section foreman, with the same headquarters, being granted a leave of absence a short time later to serve with the United States Army in World War I. In May, 1919, Mr. Caraboa returned to the Big Four as section foreman at Kankakee, and on October 21, 1941, he was advanced to assistant supervisor of track, with the same headquarters, holding that position until January 1, 1943, when he was appointed section foreman. In April of the same year he was promoted to general foreman, with headquarters at Martinsville, Ind., and in July, 1943, he was advanced to acting supervisor of track, with headquarters at Greensburg, Ind., the position he held at the time of his new appointment, effective April 1.

Obituary

Frank R. Judd, who retired in August, 1943, as engineer of buildings on the Illinois Central, with headquarters at Chicago, died at his home in that city on March 19.

Roy A. Brown, division engineer on the Chicago, Rock Island & Pacific, with headquarters at Fairbury, Neb., was killed in a motor car accident on April 7.

John G. Brennan, assistant to the vice-president of the New York Central System, with headquarters at Washington, D.C., whose death on February 23 was reported in the March issue of *Railway Engineering and Maintenance*, was born at Syracuse, N.Y., and educated at Syracuse University. He entered railroad service on April 23, 1906, as a chainman in the maintenance of way department of the New York Central at Buffalo, N.Y., and in June, 1907, he was transferred to the engineering department as a rodman on grade revision on the West Shore west of Syracuse. Mr. Brennan then served successively as a transitman in charge of a grade crossing elimination, draftsman and assistant engineer on various construction jobs on grade revision and third tracking, and resident engineer on the Tonawanda change of line in connection with the elimination of grade crossings. He was appointed assistant district engineer of the Western district, with headquarters at Buffalo, on January 1, 1920, and assistant engineer in charge of construction of the Middle district, with headquarters at Albany, on June 1, 1922. Mr. Brennan became engineer of grade crossings, Buffalo and East, with headquarters at New York, on October 1, 1924, holding that position until May 1, 1935, when he was assigned to the Association of American Railroads, with headquarters at Washington, D.C., becoming engineer of grade crossings of that association and secretary of the National Committee on Grade Crossing Elimination. Mr. Brennan returned to the service of the New York Central system on January 16, 1942, as assistant to the vice-president in charge of grade crossing matter, the position he held at the time of his death.

Ralph Norman Begien, retired vice-president of the Chesapeake & Ohio, whose death on February 27 was reported in the April issue of *Railway Engineering and Maintenance*, was born on March 15, 1875, at Boston, Mass., and was educated in the engineering department of Harvard University. For three years he served as a member of the Nicaraguan Canal Commission in Central America, following which he went to Ecuador, where he spent a year in railway engineering work. Then he returned to the United States to enter the engineering department of the District of Columbia. Mr. Begien began his career wih the Baltimore & Ohio on August 1, 1902, as an assistant engineer at Somerset, Pa., and in June, 1908, he became division engineer at Philadelphia. He was promoted to assistant to the chief engineer of the Baltimore & Ohio under A. W. Thompson on May 1, 1910, and when Mr. Thompson became general manager Mr. Begien continued as his assistant, becoming assistant to the third vice-president on May 1, 1912. In December of the same year he was promoted to assistant general superintendent, with headquarters at Baltimore, and in July, 1913, was appointed general superintendent of the Baltimore & Ohio Southwestern. In July, 1916, he was appointed chief engineer of the Baltimore & Ohio system, with headquarters at Baltimore. On April 1, of the following year, he was appointed general manager of the Eastern lines, and in July, 1918, he became assistant to federal manager (operating) of the Baltimore & Ohio Eastern Lines and New York Terminals, the Western Maryland, the Cumberland Valley, the Cumberland & Pennsylvania and the Coal & Coke, with headquarters at Baltimore. In January, 1919, Mr. Begien was appointed federal manager of the Baltimore & Ohio Western lines, with headquarters at Cinciinnati, Ohio, and at the termination of federal control he was appointed general manager of the same lines, with headquarters at Cincinnati. In 1923 he was elected vice-president of the C. & O., and the Hocking Valley, in charge of maintenance of way and equipment and operation, with headquarters at Richmond, and in 1930 he was appointed to the position he held at the time of his retirement.

Association News

Bridge and Building Association

Members of the Executive committee met in Chicago on April 24, including President J. L. Varker; Second Vice-President Neal D. Howard; Fourth Vice-President J. S. Hancock; Secretary Elinor V. Heffern; Treasurer C. R. Knowles; Treasurer-Emeritus F. E. Weise; Directors E. H. Barnhart, A. L. McCloy and L. C. Winkelhaus; and Past-Presidents A. E. Bechtelheimer, R. E. Dove and Elmer T. Howson. At this meeting the committee considered the status of the membership at length, reviewed the status of work on the reports to be presented before the annual meeting next October, and transacted considerable association business of a routine nature. Work on the 1943 Proceedings is progressing, with the hope that the volume can be made available to members by early summer. The next meeting of the Executive committee was scheduled tentatively for August 21.

American Railway Engineering Association

On April 1, the association's booklet containing the assignments and personnel of committees for the current year was mailed to all committee members. A list of all committee chairmen and of new subject assignments, taken from a preliminary release of this booklet, were published in the April issue.

None of the technical committees of the Association has definitely scheduled a meeting in May, but two of the committees, those on Water Service, Fire Protection and Sanitation, and on Track, met in Chicago during April, the former on April 18, and the latter on April 19.

The secretary's office reports that practically all of the material to be included in the 1944 Proceedings of the association, reporting the annual meeting in March, is in the hands of the printers, and that, barring unusual delays, distribution of the books to members will be possible some time during June.

Maintenance of Way Club of Chicago

Completing one of the most successful years in its history, with record over-all attendance and a high point in membership, the club held its annual meeting on April 24. Features of the meeting, which was attended by 176 members and guests, were the election of officers for the ensuing year and a round-table forum on the general theme of Looking at Our 1944 Programs. In the forum, which was conducted by Elmar T. Howson, chairman of the club's Program committee and editor of *Railway Engineering and Maintenance*, the following railway officers, all sitting at the speaker's table, participated: T. A. Blair, assistant chief engineer, Atchison, Topeka & Santa Fe System; C. G. Grove, chief engineer maintenance of way, Western region, Pennsylvania; B. R. Kulp, chief engineer, Chicago & North Western; F. H. Master, chief engineer, Elgin, Joliet & Eastern; C. H. Mottier, chief engineer, Illinois Central System; G. P. Palmer, engineer maintenance & construction, Baltimore & Ohio Chicago Terminal; and W. G. Powrie, engineer maintenance of way, Chicago, Milwaukee, St. Paul & Pacific. Speaking to questions, the various participants in the round-table discussion outlined the nature and extent of their 1944 construction and maintenance programs; pointed out the extent and ways in which these will differ from their 1943 program; discussed the current labor and materials situations; and told of departures from past practices which they are planning during the present year in the interest of meeting these situations and of improved construction and maintenance practices generally.

In the election of officers, W. S. Lacher, secretary of the American Railway Engineering Association, was advanced from first vice-president to president; C. C. Pelley, track supervisor, Illinois Central, was advanced from second vice-president to first vice-president; E. C. Vandenburgh, engineer of maintenance, Chicago & North Western, was elected second vice-president; and Neal D. Howard, managing editor, *Railway Engineering and Maintenance*, was re-elected secretary-treasurer. In addition, W. G. Powrie, engineer maintenance of way of the Milwaukee; V. V. Holmberg, supervisor bridges and buildings, Chicago & Western Indiana; and R. W. Torbert, assistant to vice-president, Oxweld Railroad Service Company, were elected directors for a term of two years. The membership of the club at the end of the year was 396.

Railway Tie Association

The Railway Tie Association will hold its twenty-sixth annual meeting at the Netherland Plaza Hotel, Cincinnati, Ohio, May 16-17. The program for this meet-

ing will give primary consideration to the critical problems of supply now confronting those in the industry and also to postwar problems and prospects. The program follows:

TUESDAY, MAY 16

Morning Session

Opening business
Report of Committee on Manufacturing Practice
Address on Effect of Increasing Speed of Trains on Crossties After the War, by J. B. Akers, assistant chief engineer, Southern, Washington, D. C.
Report of Committee on Mechanical Equipment
Address on Price Ceilings on Crossties, by Peter Stone, price executive, Lumber Pricing Branch, Office of Price Administration, Washington, D. C.

Luncheon—12:30 p.m.

Address by Albert C. Mann, vice-president, purchases and stores, Illinois Central, Chicago

Afternoon Session

Report of Committee on Timber Conservation
Report of Legislative Committee
Address on Purchasing Crossties in the Postwar Period, by D. C. Curtis, chief purchasing officer, Chicago, Milwaukee, St. Paul & Pacific, Chicago
Report of Committee on Specifications and Inspection

Annual Dinner—7:00 p.m.

WEDNESDAY, MAY 17

Morning Session

Report of Committee on Checking and Splitting
Address on Requirements of Crossties After World War I Compared with Prospects After World War II, by M. E. Towner, general purchasing agent, Western Maryland, Baltimore, Md.
Report of Committee on Government Regulations
Address on the Outlook for Crosstie Production During the Next Twelve Months by R. Van Metre, president, Wyoming Tie & Timber Co., Chicago
Report of the representative of the Railway Tie Association on the Lumber and Timber Products War Committee
Closing business

Wood-Preserver's Association

Approximately 150 railway and other men interested in the treatment and use of wood gathered for the fortieth annual meeting at the Palmer House in Chicago on April 26. Although continuing the wartime practice of confining the meeting to one day, with morning and afternoon sessions, the program has been enlarged to include a number of addresses and technical papers in addition to the committee reports. The meeting was presided over by R. H. Colley, engineer, Bell Telephone Laboratories, New York. Officers elected for the ensuing year were as follows: President, Walter P. Arnold, technical director, Wood Preserving division, Koppers Company, Orrville, Ohio; first vice-president, S. D. Hicks, vice-president, Southern Wood Preserving Co., Pittsburgh, Pa.; second vice-president, J. H. Bremicker, Pennsylvania, Philadelphia, Pa.; treasurer, Horace L. Dawson, (re-elected); members of the executive committee: H. A. Haenseler, engineering department, Western Union Telegraph Co., New York, and L. W. Kistler, superintendent of treating plants, St. Louis-San Francisco, St. Louis, Mo.

Roadmasters' Association

The various technical committees of the association are actively engaged in the preparation of reports to be presented at the annual meeting of the association to be held in Chicago on September 19-21, and looking to the completion of the reports in time for preliminary review by the Executive committee at a meeting scheduled to be held in Chicago on June 19. All material for the 1943 Proceedings is in the hands of the printer, with the expectation that copies of the book can be made available to members early in July.

Supply Trade News

General

The **Yale & Towne Manufacturing Company,** New York, has purchased the industrial scale manufacturing business of the **Kron Company,** Bridgeport, Conn.

The **Buda Company,** Harvey, Ill., was awarded the Army-Navy "E" award for outstanding achievement in war production in a colorful ceremony which was held at the company's plant on the afternoon of April 27.

Personal

Horace Lansing, research engineer of **The Rail Joint Company, Inc.,** with headquarters at 50 Church Street, New York, has been appointed chief engineer of the company, with the same headquarters.

Alton Parker Hall, whose promotion to assistant general manager of sales for the **American Chain & Cable Co.,** with headquarters at New York, was reported in the April issue of *Railway Engineering and Maintenance,* was graduated from Princeton University in 1922 and joined the Bethlehem Steel Company in that year, subsequently serving in the operating and sales departments. He was appointed assistant manager of sales of Bethlehem's New York office in 1938.

Neil C. Hurley, Jr., whose election to president of the **Independent Pneumatic Tool Company,** with headquarters at Chicago, was reported in the April issue of *Railway Engineering and Maintenance,* is a graduate of Notre Dame and in

Neil C. Hurley, Jr.

1932 became associated with the company as manager of the Electric Tool division, with headquarters at Chicago. Within a short time he was promoted to secretary, subsequently serving as vice-president before he was advanced to the position he held at the time of his new appointment.

W. A. Roberts, manager of the Tractor division; **William C. Johnson,** general sales manager of the General Machinery division; and **James M. White,** general works manager of the **Allis-Chalmers Manufacturing Company,** have been elected vice-presidents.

H. W. Davis, of the Sales division of the **Cleveland Tractor Company,** Cleveland, Ohio, has been promoted to assistant industrial sales manager. Mr. Davis entered business as a service man of the H. F. Davis Tractor Company and later headed up the sales division of that company. From 1935 to 1939 he was a dealer in Pittsfield, Mass., and on the latter date became district sales engineer of the Cleveland Tractor Company at New York. For the last two years he has been with the sales division of this company at Cleveland.

Fred H. Haggerson, vice-president and director of the **Union Carbide & Carbon Corporation,** has been elected president, with headquarters at New York, to succeed **Benjamin O'Shea,** who becomes chairman of the board. Mr. Haggerson was born at Spalding, Mich., in 1884, and is a graduate of the University of Michigan law school. For eight years he served as prosecuting attorney for the city of Menominee, Mich., after which he engaged in private practice of law in Menominee for ten years. During the World War, Mr. Haggerson served with the Department of Justice, handling enemy alien investigations in Cleveland and later in New York. Following the war, he entered the service of the Union Carbide & Carbon Corporation and has been connected with that company continuously to date. He has served as vice-president since 1938 and as a director since 1941.

Fred H. Haggerson

William F. Vosmer, who has been associated with the Steel section of the War Production Board, has rejoined the **Republic Steel Corporation** as manager of railroad sales to succeed Emmett Conneely, deceased. Before entering government service, Mr. Vosmer was manager of sales of the Bar division of Republic. Mr. Vosmer started his career in the steel business as a salesman of the Cambria Steel Company. Successively he became assistant manager of the Structural and Plate division of the Midvale Steel and

Looking rather like a miniature tank, this Schramm "Off-Track" Crawler Type Air Compressor goes everywhere under its own power. Designed to operate between the tracks or on the shoulders of the right-of-way, it furnishes air for all kinds of track maintenance work.

Just as in the American tanks that are proving such big factors of victory in the war, crawler track compressors roll smoothly, steadily, and dependably. They are mechanically driven; each track operates independently by a forward and reverse clutch control by the operator. Standard equipment includes complete engine driven compressor with electric starting, generator and battery, air tank, cooling system adequate for all railroad requirements.

Additional models are available in sizes ranging from 20-420 cu. ft. of actual air; mounted on rail cars; skidded; two wheel and four wheel trailer type with pneumatic or steel wheels, etc.

Ordnance Company and vice-president in charge of sales of Donner Steel Company, which position he held until this company became a part of Republic in 1930.

Ernest Schluesener, assistant vice-president in charge of engineering and production control of the **Oliver Iron & Steel Corp.**, has been elected vice-presi-

Ernest Schluesener

dent in charge of operations, with headquarters at Pittsburgh, Pa. **John P. Roche,** has been appointed secretary and assistant to the president of the Oliver corporation, with headquarters at Pittsburgh.

Mr. Schleusener is a graduate of Carnegie Tech, and since joining the corporation has served in various executive capacities in the plant. In May, 1942, he was advanced to the position he held at the time of his new appointment effective May 1.

J. A. Drain, assistant to the president of the **Sullivan Machinery Company,** Michigan City, Ind., has been elected vice-president in charge of product engineering, research and development. **O. J. Neslage,** general sales manager, has been elected vice-president in charge of sales in the United States and Mexico.

George A. W. Bell, Jr., formerly manager of sales to the railroads of the **Caterpillar Tractor Company,** Peoria, Ill., and since 1938 district representative of the company in Colorado, Wyoming, Nebraska, Kansas and Central and Eastern Montana, with headquarters at Denver, Colo., has resigned to become general sales manager of the Connelly Machinery Company, Billings, Mont., distributors of Caterpillar equipment in Montana.

E. J. Masline, general superintendent of the **Union Metal Manufacturing Company,** has been promoted to general manager and a director of the Pacific Union Marbelite Company (a subsidiary of the Union Metal Manufacturing Company), with headquarters at Los Angeles, Cal. **A. R. Miller,** electrical and maintenance engineer of the parent company, has been advanced to general superintendent, succeeding Mr. Masline, with headquarters at Los Angeles.

Russell M. Allen, whose election to vice-president in charge of sales of the **Allegheny Ludlum Steel Corporation** was reported in the April issue of *Railway Engineering and Maintenance* entered the employ of the Allegheny Steel Company in January, 1920, as a production man in the mill. Two years later he entered the sales department and in 1923 was transferred to Detroit, Mich., as a member of the sales organization in that city. After two years service in Detroit, he was made district manager of the Chicago territory, which position he held until 1934 when he was appointed assistant sales manager at Brackenridge, Pa. He held this position through the merger and formation of the Allegheny Ludlum Steel Corporation in 1938 and in 1940 was promoted to general manager of sales with the same headquarters.

Stanley H. Smith, whose election to vice-president of the **Philadelphia Steel & Wire Corp.,** Philadelphia, Pa., was reported in the April issue of *Railway Engineering and Maintenance* was born in Toronto, Ont., on August 4, 1886, and was educated at the University of Pennsylvania and Drexel Institute. He entered sales work on April 1, 1906, with the Pennsylvania Steel Company and remained with this company until June 1, 1917, when it was acquired by the Bethlehem Steel Company. He continued with the latter company and later was promoted to sales manager at Cleveland. He resigned on April 1, 1921, to establish a manufacturers agency and in 1929 incorporated Stanley H. Smith & Co. Later he was elected vice-president of Eastern Railway Supplies, Inc.

George P. Torrence, vice-president and general manager of the Rayon Machinery Corporation, Cleveland, Ohio, has been elected president of the **Cleveland Pneumatic Tool Company** and its subsidiary, the Cleveland Pneumatic Aerol, Inc., and **Daniel C. Green,** former president, has been elected chairman of the board of both companies.

Frank M. Blum, assistant manager of the P&H Crane Sales division of the **Harnischfeger Corporation,** Milwaukee, Wis., has been promoted to manager of that division, succeeding **Ben Van Horn,** whose retirement was reported in the April issue of *Railway Engineering and Maintenance.* Mr. Blum went with the company in 1929, subsequently serving as chief draftsman of the Electrical division and chief engineer of the Electrical Application division before being advanced to the position he held at the time of his new appointment which became effective on May 1.

The **H. K. Porter Company, Inc.,** Pittsburgh, Pa., has appointed three new district managers as follows: **Joseph F. Gaffney,** Rochester, N.Y., serving northern New York; **R. W. Steves,** Cincinnati, Ohio, serving major portions of Ohio, Kentucky, West Virginia and Indiana; and **W. T. Campbell,** Philadelphia, Pa., covering western New Jersey, eastern Pennsylvania and Delaware. **J. L. Cunningham,** Union, N.J., has been appointed field service engineer, for the Chemical Process and Quimby Pump divisions of Porter in northern New Jersey, with headquarters at Newark, N.J.

Obituary

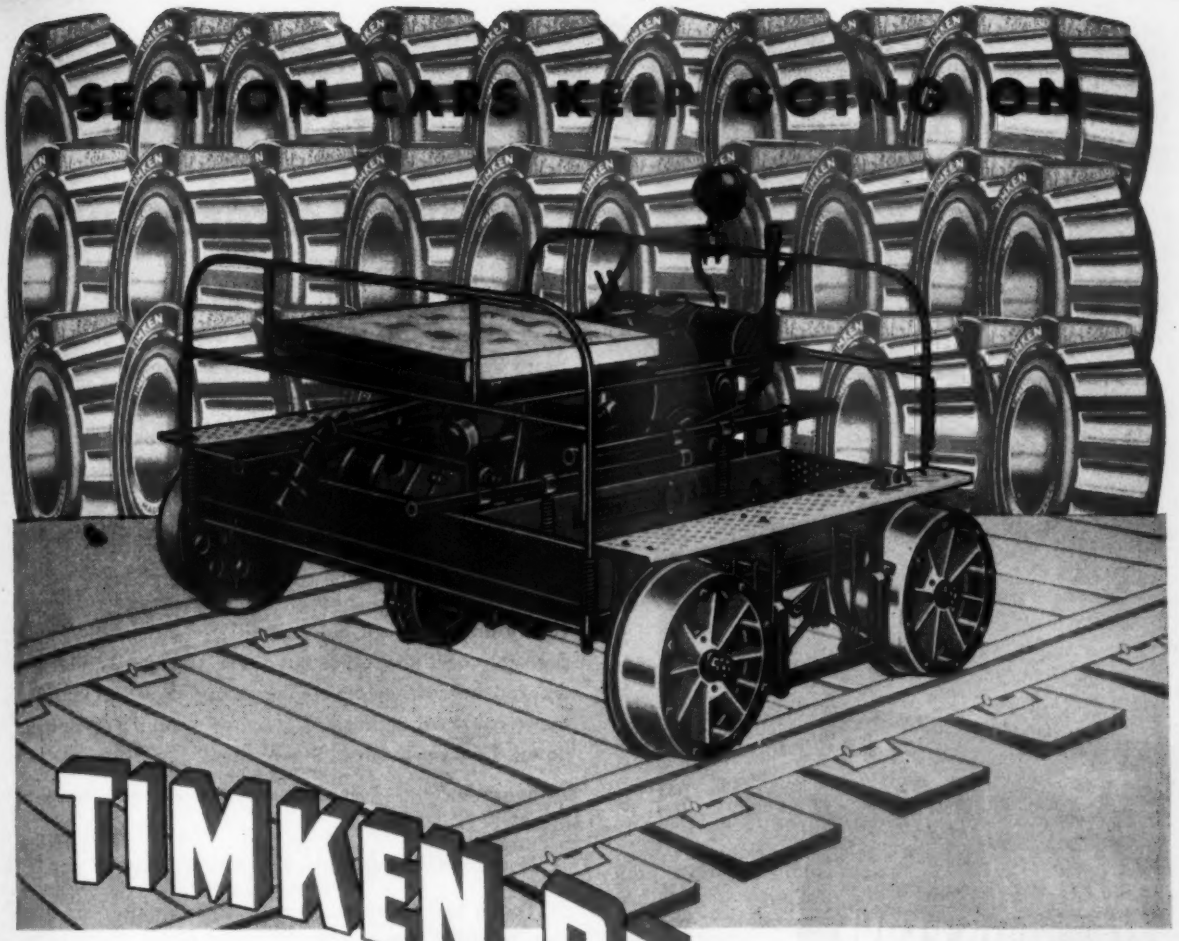
Benjamin F. Affleck, retired president of the Universal Atlas Cement Company, whose death on February 14 was reported in the March issue of *Railway Engineering and Maintenance,* was born on March 1, 1869, at Belleville, Ill., and started his career at the age of 14, working for several years as a machinist, a stenographer and a clerk with various concerns. In 1896 he began as a stenographer for the Illinois Steel Company (now the Carnegie-Illinois Steel Corporation), and in 1901 became branch manager of that company's cement department at St. Louis. In 1906, when this department became a subsidiary of the United States Steel Corporation, Mr. Affleck became general sales manager. In 1915 he was elected president. He was one of the early members of the Portland Cement Association and was largely instrumental in reorganizing it in 1916, following which he served as its president for five years.

Melvin B. Pattison, chairman of the board of the Industrial Brownhoist Corporation, whose death on February 11 was reported in the April issue of *Railway Engineering and Maintenance,* joined the Brown Hoisting Machinery Company of Cleveland, Ohio, as a salesman in 1901, and subsequently was appointed sales manager and vice-president and general manager. When the Brown Hoisting Machinery Company merged with the Industrial Works of Bay City, in 1927, he was appointed vice-president and general manager of the new corporation. He was elected president in 1934, and chairman of the board in April 1939.

Flexible Shafting for Remote Controls.—The Mall Tool Company, Chicago, has published a brochure on the use of flexible shafting for remote controls. Designated as brochure No. 273, the booklet contains a number of full-size reproductions of various styles of flexible shafts and end fittings for adaption to hundreds of remote control applications. Explanatory text accompanies each illustration.

Blackmer Pump Bulletin.—A six-page bulletin entitled Facts About Rotary Pumps has been published by the Blackmer Pump Company, Grand Rapids, Mich. The bulletin, which is designated as No. 304, is printed in color and contains a number of illustrations and descriptions of sections and parts of the Blackmer line of rotary pumps. Each illustration is accompanied by descriptive text while an entire page is devoted to picturing and describing the various types of pumps manufactured by the company.

Fasteners—Vital in Every Industry.—A 24-page bulletin, the first of a series to be published periodically, with this title, has just been released by the American Institute of Bolt, Nut and Rivet Manufacturers, Hanna Building, Cleveland, Ohio. This bulletin includes an article on How Tight Should a Bolt Be, and descriptions of the rolled screw thread process, the cold driving of large rivets and types of standard square and hexagon bolts.



TIMKEN BEARINGS

Northwestern 535 One Man Inspection Car equipped with Timken Bearings on all axles. Manufactured by Northwestern Motor Co., Eau Claire, Wisconsin.

Besides making rail cars run smoother and enabling them to go faster, Timken Tapered Roller Bearings help keep them out of the repair shop by eliminating wear on axles, preserving wheel gauge and preventing wheel breakage. They carry radial, thrust and combined loads with a wide margin of safety and hold moving parts in correct relationship under all operating conditions.

You can always depend upon Timken Bearing Equipped cars to be ready for instant action when needed and to get maintenance crews to and from the job without delay. When buying new section motor cars and trailers look to the future and make sure they are equipped with Timken Bearings. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

"No Men— More Advertising"

"Boss, I'm worn out. The calls these railways are making on me are breaking me down. I've got to have more help—and I'm not fooling," complained the star salesman to his railway sales manager.

"I realize, Bill, that you're being driven a lot harder now as the roads are opening up more work and need more of our materials. But, to get down to brass tacks, just what is it that you want?" replied the railway sales manager.

"Two assistants—one to take over the territory that Henry used to work before you laid him off in the depression and the other to cover the roads that Jim worked before he left for the Army. You're expecting me to cover all of these roads now—and it's getting me down. I've got to have these men."

"I agree with you, Bill,—whom do you have in mind?"

"Nobody in particular—I'm leaving that to you."

"That's not so easy. Everybody's looking for good men today. I know where I could place 25 men like Jim tomorrow if I could locate them, but they're not available—and they won't be until this war's over."

"What am *I* going to do, in the meantime?"

"I have an idea."

"What is it?"

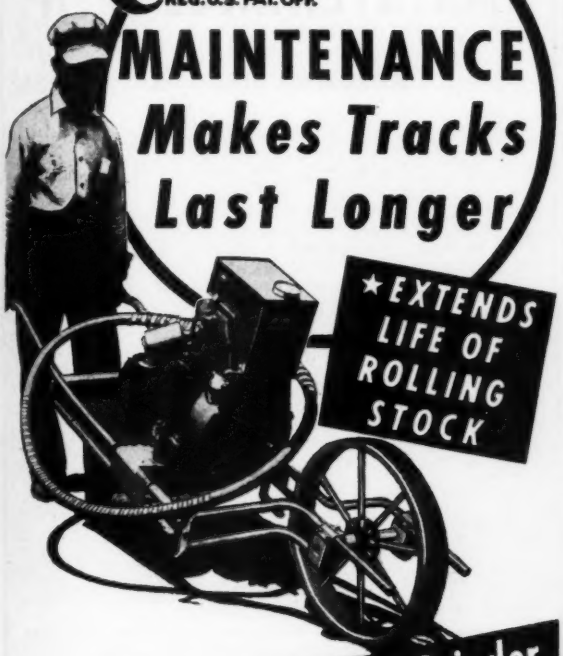
"Let's increase our advertising in *Railway Engineering and Maintenance* and make it carry our story to a lot of the men you'd like to see but can't get around to call on. It can be made to give them a lot of the information they want—and it'll keep us from being forgotten."

"You're right. We can't get any more men now and we've got to get along as best we can for the duration. Advertising is our answer."

RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS

Mall
REG. U.S. PAT. OFF.

MAINTENANCE
Makes Tracks
Last Longer



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★ *Off-The-Track*
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Where MALL Rail Grinders keep rails and switchpoints in fighting trim, you'll find longer rail life, better fitting and acting switches, less rail and road bed maintenance, plus reduced shock on rolling equipment.

MALL Rail Grinders can be wheeled anywhere on the right-of-way. The variable speed, 6 H.P. easy-starting, gasoline engine and heavy duty flexible shafting make the unit readily adaptable to rail, frog, crossing and switchpoint grinding. Patented slip-lock detail on ends of flexible shaft and various attachments reduce tool changing time to a minimum. Unit is ruggedly constructed to stand up under hard continuous usage.

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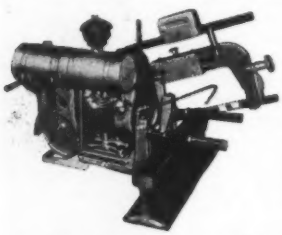
CLEANER RAIL CUTTING *with* RACINE Portable Rail Saw

CROP your rail ends clean and smooth in one cut with the Racine Rail Cutter. Eliminate grinding of rough ends. Stop damage to grain structure that may develop through torch cutting or the nick and break method. The Racine Machine is equally adaptable to rail cropping on the track or at the pile. It cuts fast, clean and economically.



LIGHT WEIGHT LOW COST

Two men can readily remove or place a Racine Machine on the track; only one operator needed to run the saw. Cut can be made within 3" of rail end. Saving of man-hours, tool cost, time per cut and transportation of rails makes the Racine Portable Rail Cutter low cost equipment for rail cropping. Available with gasoline, electric or compressed Air Motors.

Racine Rail Cutters are ideal for proper cutting and fitting of rail at interlocking plants, crossings and switches. Use these machines for accurate cutting on insulated joints, at curves and to remove split, or worn and battered rail ends. Our bulletin 58A gives you full information. Address Dept. RE-S.

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CONTENTS

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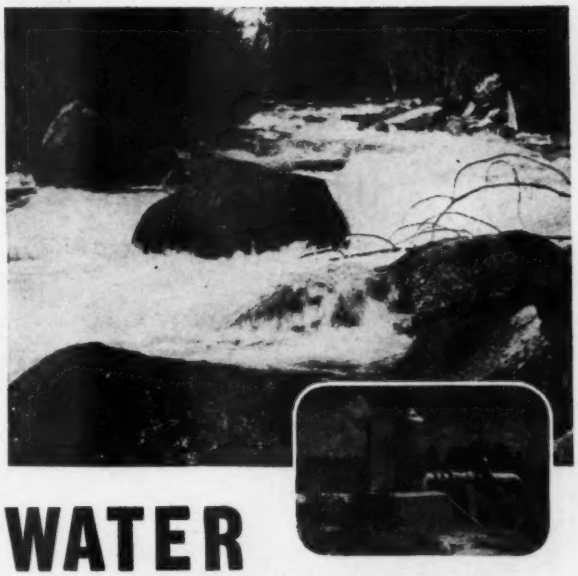

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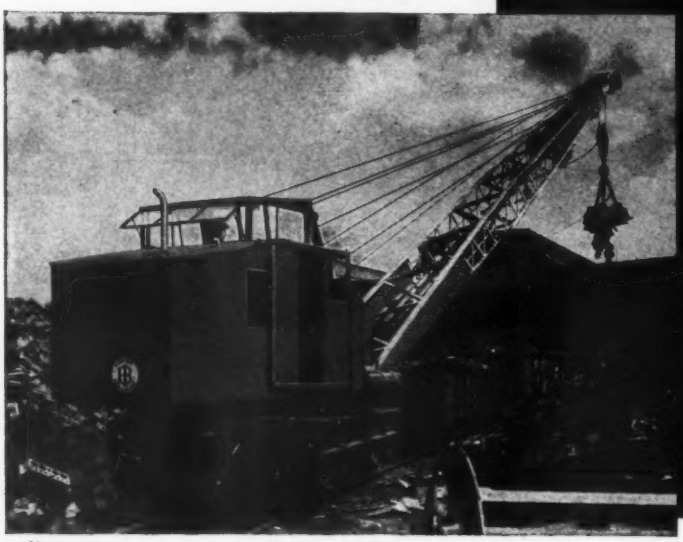

The monitor type cab on I.B. Cranes provides 360° visibility and better ventilation.

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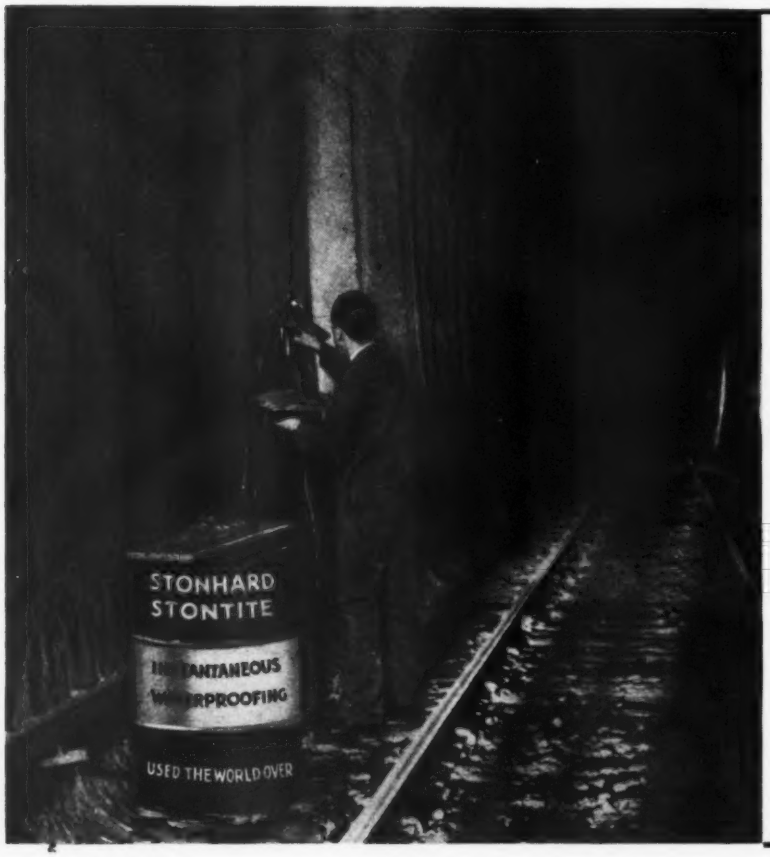

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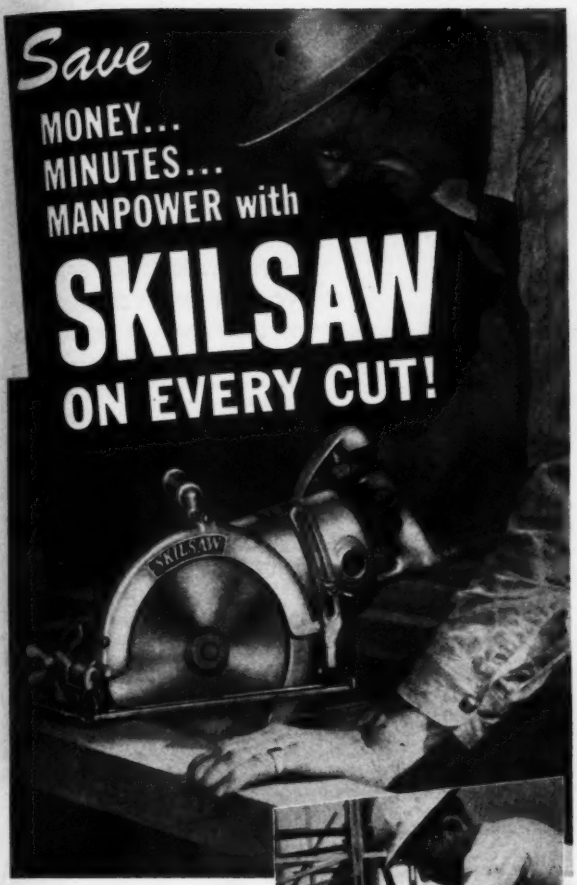

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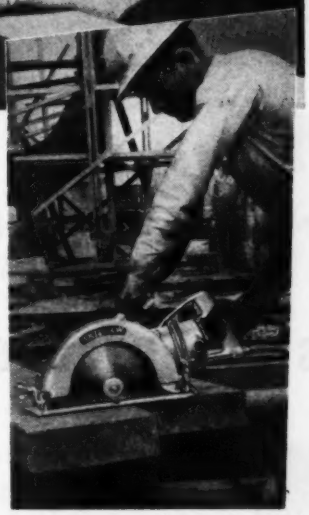

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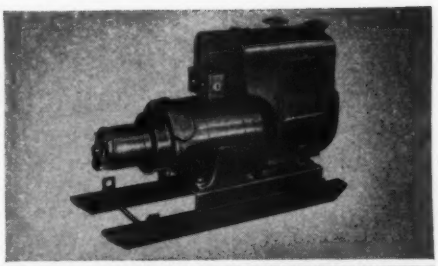

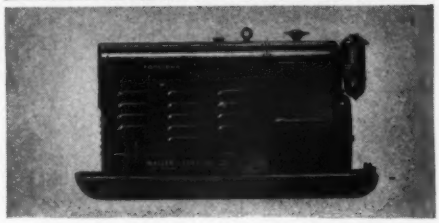

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Contours and shapes the ballast; levels the berm and cuts a side drainage ditch parallel to the track. Wings quickly set from 25 to 45 degrees to cut any practical depth below top of rail and will slope the cut from the ditch outward. Plus a ballast plow which cuts from 1 to 6 inches below top of rail. Cuts foul ballast away from end of ties.

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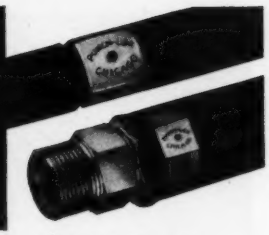
HOSE BANDING METHOD



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PUNCH-LOK Streamlined Hose Banding Method is being used in hundreds of production and maintenance jobs in all industries for connecting high-pressure hose; splicing electric cable; stopping leaks in steam and water lines; reinforcing and mending splits in crossarms and ladder rails; tieing rigid conduit or flexible cable to existing pipe lines or girders; tieing ends of wire or manila rope to prevent fraying—and many other jobs. PUNCH-LOK is giving wartime industries a fast, safe, economical, quality banding method. Investigate NOW the many advantages it will have for you in your present and postwar work. Let PUNCH-LOK solve your clamping or banding problems!

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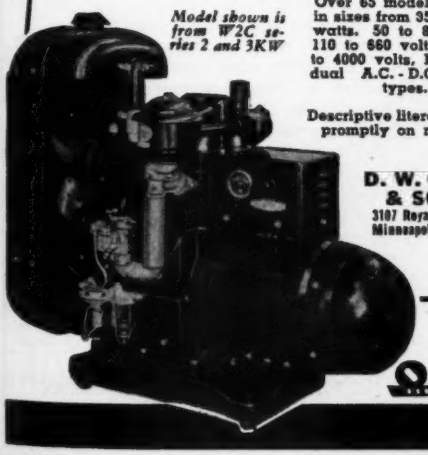

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Over 65 models, ranging in sizes from 350 to 35,000 watts. 50 to 800 cycles, 110 to 660 volts, A.C.—6 to 4000 volts, D.C.—Also dual A.C.-D.C. output types.

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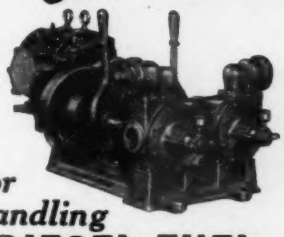
the PUMP that is "Self-Adjusting for Wear"



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have been standard equipment for more than forty years.

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5 to 750 GPM. Pressures to 300 psi.
Single or multiple units.
All standard drives.

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7 to 25 GPM—54 Models.
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FACTS ABOUT ROTARY PUMPS

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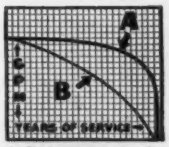
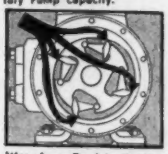


A—Blackmer pump capacity. Note the long sustained efficiency. B—Conventional Rotary Pump capacity.



Wear is confined to the tips of the buckets, which automatically compensate for wear.

This much can wear away, without affecting the capacity of the pump.

When worn out, replace the buckets and the pump is restored to normal efficiency.

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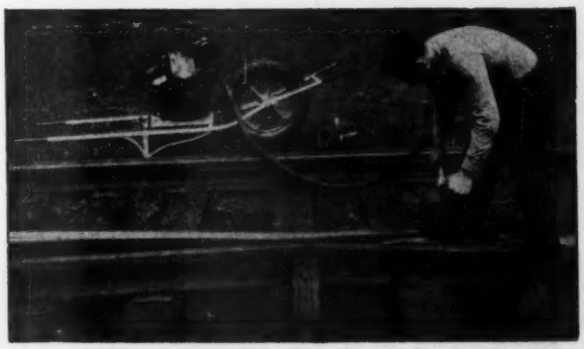
Grind off overflowed metal from rail ends . . . stock rails . . . switch points—to reduce maintenance worries and lengthen track life. Railway Track-work Grinders speed the job. Models available for grinding off surface welds; smoothing corrugations; cross-slotting, bevelling, cutting rail joints. Gasoline or electric driven. Write for latest data bulletins.



Model P-22 Free-Hand Grinder—one of many models.

Railway Trackwork Co.

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Will help keep traffic moving in yards and terminals without delays caused by sharp wheel flanges climbing on worn switch points.

They will also prolong the life of switch points and stock rails.

Order now to guard your switch points and save labor of renewals.

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Most H.P. per pound

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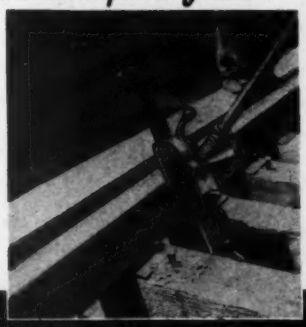

Simplex No. 310, 15-tons capacity. Height, 22¼". 13" lift. Base, 3⅞" wide; 10¾" long.

On bridges, trestles, viaducts—wherever ties are closely spaced to compensate for absence of ballast—the No. 310 saves time on lining and surfacing of track. Tilts on base. Chain—standard equipment—has bolt-pulling end link.

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- Straight pull on rail
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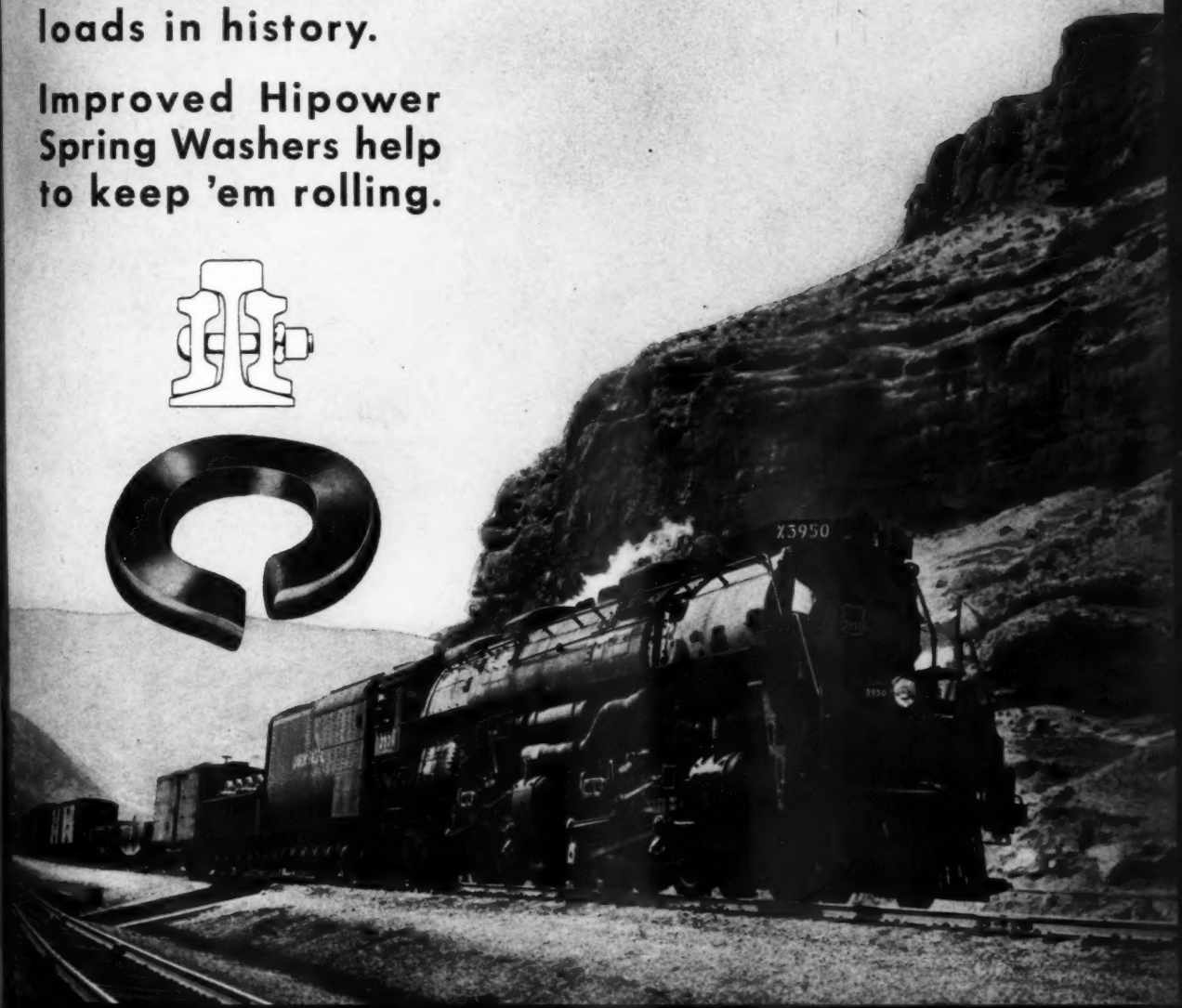

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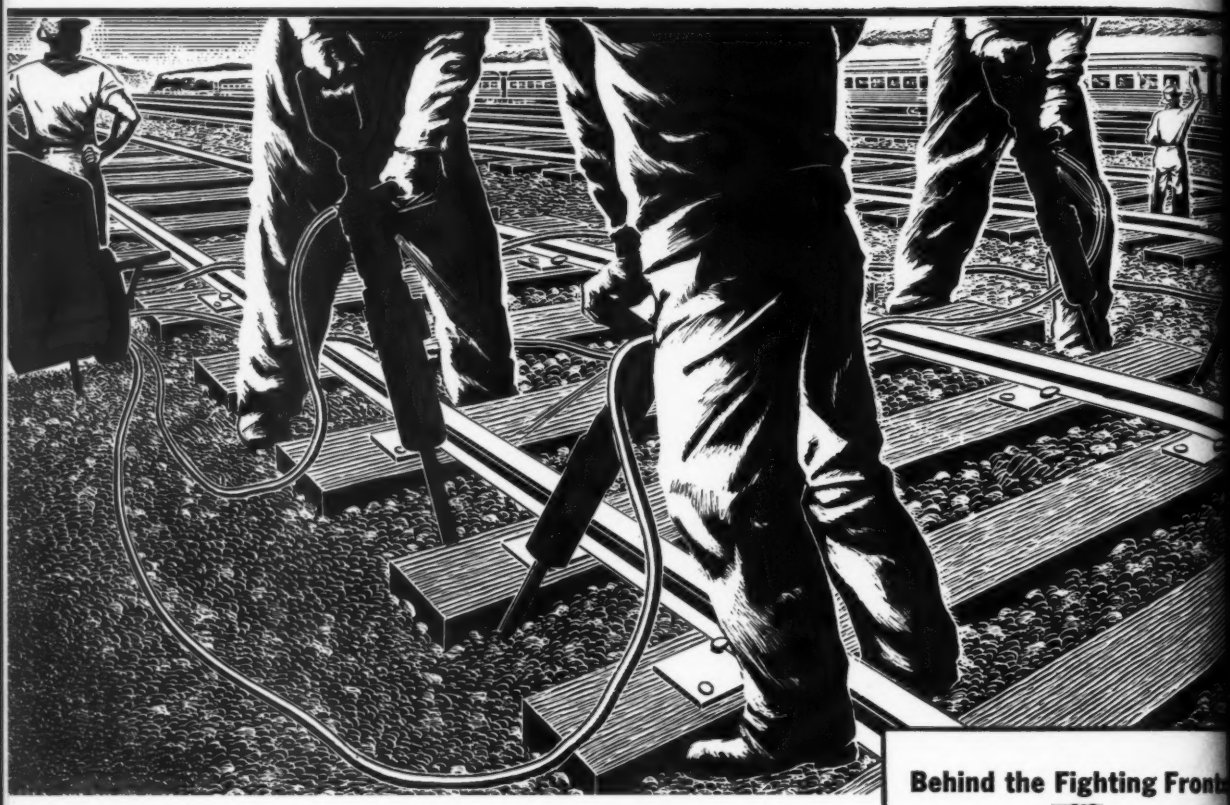

When you railroad men are moving 2 million soldiers a month, a new body of troops every 6 minutes, every bit of maintenance equipment naturally must be *job-tested!*

Weaklings cough, wheeze and go under. This Blue Brute Tie-Tamping partnership has passed its war test, because, like other easy-breathing, easy-handling Brutes, it's teamed up to *work together!*

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Blue Brutes helped equip several railway battalions for overseas duty. Here, at home, our soldiers and sailors see them in action** for track laying and repair, as well as for new construction in Army camps, Navy yards, air bases and ordnance plants.

**Blue Brute compressors and air tools are painted olive drab for the Army, battleship gray for the Navy.

Get more WORTH from air with WORTHINGTON

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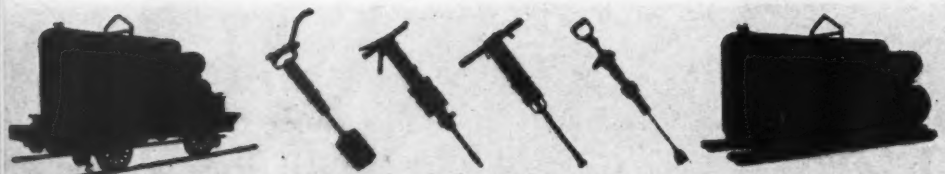

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